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EFFECT OF RATE OF SEEDING ON YIELD AND QUALITY OF FIBER OF CORCHORUS CAPSULARIS AND CORCHORUS OLITORIUS [1]

JULIAN P. BAQUIRAN

The yield of fiber of *Corchorus capsularis* decreased as the rate of seeding was increased. *Corchorus olitorius*, however, did not show any significant increase or decrease in yield at all rates of seeding. For commercial fiber production, the 11.0-kilogram rate may be recommended for *C. capsularis*, and the 15.4- and 17.6-kilogram rates for *C. olitorius*. For seed production, the 13.2- and 15.4-kilogram rates may be used for *C. capsularis*, whereas the 11.0-kilogram rate seems to be the best for *C. olitorius*. Further studies should be made to verify these results.

The percentage of extraction of fiber in the 105-day-old harvests of both species was high regardless of the rate of seeding. *C. capsularis* decreased in height as the rate of seeding was increased. On the other hand, *C. olitorius* increased in height as the rate of seeding was increased. In both species, tensile strength was greatest when the plants were 90 days old. Rate of seeding did not influence significantly the tensile strength of the fibers. Fibers obtained from the 75- and 90-day-old harvests of both species were superior in quality to those obtained from later harvests.

Rate of seeding and distance of planting are essential factors in the production of seeds and fiber of jute. Cruz [2] reported the best rate of seeding to be 5 to 6 gantas of seeds to a hectare and the best distance, 50 to 60 centimeters between furrows by the drill method. He also found that the maximum yield of fiber to a hectare is 20 piculs or 1,275 kilos.

In the present work, the performance of two species of jute, *Corchorus capsularis* Linn. and *Corchorus olitorius* Linn., with emphasis on the effect of rate of seeding on the yield of seeds and quality of fiber, was studied from May, 1951, to March, 1952, in the Division of Fiber and Oil Crops, Department of Agronomy, College of Agriculture.

MATERIALS AND METHODS

Planting. A prepared field of clay loam soil was divided into 20 plots of 50 square meters each with a one-meter path between plots. On May 25, 1951, seeds of *C. capsularis* and *C. olitorius*, produced in the Central Experiment Station, were planted by means of a hand drill. The five rates of seeding used, based on 100 per cent germi-

[1] Central Experiment Station Contribution No. 1715. Thesis presented for graduation with the degree of Bachelor of Science in Agriculture from the College of Agriculture. Prepared in the Department of Agronomy under the direction of Associate Professor Pedro A. David.

[2] E. E. Cruz, Plant Industry Digest, [11] 11, 13 (1946).

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nation, were 55 grams of seeds to a plot (11.0 kilograms to a hectare), 66 grams (13.2 kilograms to a hectare), 77 grams (15.4 kilograms to a hectare), 88 grams (17.6 kilograms to a hectare), and 99 grams (19.8 kilograms to a hectare). Since the percentage of germination of *C. capsularis* was only 60 per cent and that of *C. olitorius,* 40 per cent, the rate of seeding was increased.

For each species, five plots were planted for seed production and five for fiber production. The planting distances for seed production were 50, 60, 70, 80, and 90 centimeters between furrows and 5.08 centimeters between hills; those for fiber production were 40, 50, 60, 70, and 80 centimeters between furrows and 5.08 centimeters between hills. A planting line marked at intervals of 5.08 centimeters was used during the drilling to maintain uniform distances between the hills.

Weeding and cultivation. The plots were weeded and cultivated with a light hoe when the plants were three weeks old and again when they were four weeks old. Subsequent weeding and cultivation were not necessary as the plants were by then tall enough to overcome the growth of weeds.

Control of pests and diseases. The insect *Anomis sabulifera* Guen'ee [3] was found feeding on the young leaves and shoots of the plants. To check the infestation, the plants were sprayed with 10 grams of 50 per cent DDT powder dissolved in a gallon of water. A second spraying was necessary because the first spraying was followed by a heavy rain.

No diseases were found on either species of *Corchorus.*

Measurement of the plants. The heights of 10 representative plants selected at random from every plot were measured at harvest.

Harvesting. For each species, four harvests were made from the plots for fiber production and three from those for seed production. The plants were cut at ground level with a sharp bolo. Three representative one-square-meter samples were taken from each plot during each harvest. The samples from the plots for seed production were harvested a month later than those from the plots for fiber production.

The leaves of the plant samples for fiber were removed, and the fresh stalks were tied into bundles, weighed in the laboratory, and then submerged in running water in a concrete tank. Twelve days later the fiber was separated from the pith and was washed to remove the pulp and the gum. After the fiber had been dried in the sun, it was weighed.

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[3] Identified by Dr. Silverio M. Cendaña, of the Department of Entomology.

Determination of tensile strength. Samples of single-fiber strands were tested for their tensile strength with a Scott Tester IP-2 Tensilgraph machine. The tensile strength, expressed in breaking length, was computed by the following formula of Botkin, Shires, and Smith: [4]

$$\text{Tensile strength} = \frac{\text{Breaking load}}{\text{Weight of sample per centimeter}}.$$

RESULTS AND DISCUSSION

Yield of the different plots of the two species. *C. capsularis* had a tendency to decrease in yield as its rate of planting was increased, whereas *C. olitorius* did not show any significant increase or decrease in yield at all rates of seeding and at all ages of the plants at harvest (tables 1 and 2).

The 11.0-kilogram rate of seeding in *C. capsularis* produced the highest yield of fiber; the 17.6-kilogram rate had the lowest average yield. On the other hand, the 17.6-kilogram rate in *C. olitorius* gave the highest yield of fiber, whereas the 13.2-kilogram rate produced the least fiber. Statistical analysis showed that the rate of seeding in *C. capsularis,* unlike in *C. olitorius,* influenced significantly the yield of fiber.

The mean yield of fiber to a square meter in *C. capsularis* varied according to the age of the plants at harvest. The 75-day-old plants had the highest average yield; the 120-day-old plants, the lowest. The age of the plants at harvest, however, did not significantly influence the yield of fiber.

The computed yield was based on the average harvest to a square meter multiplied by 50 square meters to a plot. The plants which were harvested 75 days after sowing gave the highest computed yield of fiber, 4,476.50 grams. The 90-day-old plants yielded 3,506.50 grams; the 105-day-old plants, 2,713.50 grams; and the 120-day-old plants, 2,580.00 grams.

In *C. olitorius,* the 90-day-old harvest produced significantly more fiber than the 75-, 105-, and 120-day-old harvests (table 2). The rate of seeding, upon statistical analysis, was found not to affect the yield of fiber.

The rate of seeding and the age at harvest did not influence significantly the yield of seeds in both species (tables 3 and 4). Only a few seeds were collected from the 105-day-old plants because of the great number of immature capsules harvested, which was approximately 50 per cent. Many of the seeds from the 135-day-old plants were lost through shattering of the overmature capsules.

[4] C. W. Botkin, C. B. Shires, and E. C. Smith, *New Mexico Agric. Exper. Sta. Bull. 300* (1943).

Percentage of extraction. The percentage of extraction was computed by dividing the weight of dry fiber by the weight of the fresh straw multiplied by 100. In both species the 105-day-old harvest gave the highest percentage of fiber extraction; the 120-day-old harvest, the second highest (tables 5 and 6). The differences between the two harvests were significant. The 120-day-old harvest was, in turn, significantly better than the 75- and 90-day-old harvests.

Rate of seeding did not significantly influence the percentage of fiber extraction.

Height of the plants. In *C. capsularis,* the 11.0-kilogram rate produced the tallest plants, probably because the distance of planting was too small to allow for the proper vegetative development of the plants (table 7). The 13.2-kilogram rate produced the next tallest plants, followed by the 15.4-kilogram, the 17.6-kilogram, and the 19.8-kilogram rates. The differences in height due to rate of seeding were significant.

Plant growth in *C. capsularis* was very rapid up to 105 days after planting. From thence up to 120 days, growth was slower. The 120-day-old plants were significantly taller than the 105-day-old plants. The differences in height between the 90-day-old and the 75-day-old plants were also significant.

The height of *C. olitorius,* on the other hand, significantly increased as the rate of seeding was increased (table 8). This result may have been due to the fact that the plants had to compete for light. The 19.8-kilogram rate produced the tallest plants, and the 11.0-kilogram rate, the shortest.

As in *C. capsularis,* plant growth in *C. olitorius* was rapid up to 105 days after planting and slower from thence up to 120 days. The 120-day-old plants were the tallest, followed by the 105-, the 90-, and the 75-day-old plants. The differences were significant.

Quality of the fiber. The fibers obtained from the different plots of both species when the plants were harvested at the age of 75 and 90 days were more or less the same in softness, brightness, and luster. They were superior to those of the 105- and 120-day-old harvests. No significant differences in tensile strength of the fiber were found among the different rates of seeding in both species, but the tensile strength of the fiber decreased as the plants grew older (tables 9 and 10). The 90-day-old plants produced the strongest fiber, and the 120-day-old plants, the weakest. The differences in tensile strength of fiber between the 90-day-old plants and the 105- and 120-day-old plants, and between the 75-day-old and 120-day-old plants were significant.

TABLE 1

Yield of dry fiber of C. capsularis Linn. in grams to a square meter as influenced by rate of seeding and age of plants at harvest

RATE OF SEEDING TO A HECTARE	DISTANCE OF PLANTING	AGE OF PLANTS AT HARVEST IN DAYS												MEAN
		75			90			105			120			
kg.	*cm.*													
11.0	40 × 5.08	148	104	138	132	98	120	130	164	128	122	166	120	130.83
13.2	50 × 5.08	95	86	88	96	108	64	90	82	94	108	94	76	90.92
15.4	60 × 5.08	76	117	88	70	84	74	104	86	124	68	78	78	87.25
17.6	70 × 5.08	76	90	43	46	74	64	78	60	84	100	92	76	73.58
19.8	80 × 5.08	71	74	55	64	106	62	96	112	64	94	98	90	82.17
Mean		89.93			74.13			54.27			51.60			

Analysis of variance

SOURCE OF VARIATION	DF	SUM OF SQUARES	VARIANCE	COMPUTED F-VALUE	TABULAR F-VALUE	
					5%	1%
Rate of seeding	4	23,549.00	5,887.25	22.49 [a]	3.26	5.41
Age at harvest	3	2,423.25	807.75	3.09	3.49	5.95
Rate × age	12	3,141.17	261.76			
Sampling error	40	10,320.33	258.01			
Total	59	39,434.75				

[a] Highly significant.

L.S.M.D. = 14.37

TABLE 2

Yield of dry fiber of C. olitorius Linn. in grams to a square meter as influenced by rate of seeding and age of plants at harvest

RATE OF SEEDING TO A HECTARE	DISTANCE OF PLANTING	AGE OF PLANTS AT HARVEST IN DAYS												MEAN
		75			90			105			120			
kg.	*cm.*													
11.0	40 × 5.08	57	67	48	88	78	74	54	35	45	46	82	76	62.50
13.2	50 × 5.08	42	50	56	56	64	70	54	52	48	52	36	56	52.83
15.4	60 × 5.08	63	75	52	82	80	72	58	68	66	46	56	58	64.67
17.6	70 × 5.08	80	81	93	99	74	72	48	56	78	44	36	42	67.75
19.8	80 × 5.08	66	72	68	62	79	64	49	61	42	48	42	54	58.75
Mean		60.00			74.13			54.27			51.60			

Analysis of variance

SOURCE OF VARIATION	DF	SUM OF SQUARES	VARIANCE	COMPUTED F-VALUE	TABULAR F-VALUE	
					5%	1%
Rate of seeding	4	1,580.83	395.21	1.25	3.26	5.41
Age at harvest	3	4,867.58	1,622.58	5.15[a]	3.49	5.95
Rate × age	12	3,780.10	315.01			
Sampling error	40	2,156.67	53.92			
Total	59	12,385.33				

[a] Significant.

L.S.M.D. = 12.02

TABLE 3

Yield of seeds of C. capsularis Linn. in grams to a square meter as influenced by rate of seeding and age of plants at harvest

RATE OF SEEDING TO A HECTARE	DISTANCE OF PLANTING	AGE OF PLANTS AT HARVEST IN DAYS									MEAN
		105			120			135			
kg.	*cm.*										
11.0	50 × 5.08	50	36	64	94	50	70	42	36	82	58.22
13.2	60 × 5.08	58	92	50	56	90	68	56	62	64	66.22
15.4	70 × 5.08	56	60	54	50	52	68	86	92	78	66.22
17.6	80 × 5.08	46	38	68	94	40	40	42	64	68	55.33
19.8	90 × 5.08	50	40	40	74	96	32	48	40	78	55.33
Mean		55.33			64.93			62.53			

Analysis of variance

SOURCE OF VARIATION	DF	SUM OF SQUARES	VARIATION	COMPUTED F-VALUE	TABULAR F-VALUE	
					5%	1%
Rate of seeding	4	1,114.13	278.53	0.90	3.84	7.01
Age at harvest	2	1,124.80	562.40	1.82	4.46	8.65
Rate × age	18	2,472.54	309.07			
Sampling error	30	8,703.33	290.11			
Total	44	13,414.80				

TABLE 4

Yield of seeds of C. olitorius Linn. in grams to a square meter as influenced by rate of seeding and age of plants at harvest

RATE OF SEEDING TO A HECTARE	DISTANCE OF PLANTING	AGE OF PLANTS AT HARVEST IN DAYS									MEAN
		105			120			135			
kg.	*cm.*										
11.0	50 × 5.08	40	33	38	76	65	68	34	50	34	48.67
13.2	60 × 5.08	29	20	14	38	38	45	32	44	82	38.00
15.4	70 × 5.08	23	19	11	36	46	19	36	20	40	27.78
17.6	80 × 5.08	26	10	12	18	36	62	34	36	16	27.78
19.8	90 × 5.08	6	13	38	16	21	15	54	36	48	27.44
Mean		22.13			39.93			39.93			

Analysis of variance

SOURCE OF VARIATION	DF	SUM OF SQUARES	VARIATION	COMPUTED F-VALUE	TABULAR F-VALUE	
					5%	1%
Rate of seeding	4	3,163.47	790.87	1.64	3.84	7.01
Age at harvest	2	3,133.20	1,566.60	3.25	4.46	8.65
Rate × age	8	3,853.46	481.68			
Sampling error	30	3,896.68	129.89			
Total	44	14,046.81				

TABLE 5

Percentage of extraction of C. capsularis Linn. as influenced by rate of seeding and age of plants at harvest

RATE OF SEEDING TO A HECTARE	DISTANCE OF PLANTING	AGE OF PLANTS AT HARVEST IN DAYS												MEAN
		75			90			105			120			
kg.	*cm.*													
11.0	40 × 5.08	4.2	4.0	4.2	6.1	3.7	6.3	7.3	7.1	5.9	6.8	5.6	5.6	5.48
13.2	50 × 5.08	4.4	4.5	3.1	5.4	4.3	4.0	6.3	5.0	5.5	6.3	4.5	5.5	4.80
15.4	60 × 5.08	4.1	4.1	3.8	5.6	5.4	4.5	5.4	6.8	6.5	5.3	6.8	6.1	5.37
17.6	70 × 5.08	4.3	5.2	4.0	4.2	4.7	4.5	5.2	5.5	6.3	6.0	6.8	6.0	5.23
19.8	80 × 5.08	5.6	4.6	3.0	5.5	5.1	4.7	6.8	6.7	7.3	5.6	6.3	6.6	5.65
Mean		4.21			4.27			6.17			5.99			

Analysis of variance

SOURCE OF VARIATION	DF	SUM OF SQUARES	VARIANCE	COMPUTED F-VALUE	TABULAR F-VALUE	
					5%	1%
Rate of seeding	4	3.87	0.97	3.23	3.26	5.41
Age at harvest	3	38.42	12.81	42.70[a]	3.49	5.95
Rate × age	12	3.61	0.30			
Sampling error	40	20.55	0.51			
Total	59	66.45				

[a] Highly significant.

L.S.M.D. = 0.44

TABLE 6

Percentage of extraction of C. olitorius Linn. as influenced by rate of seeding and age of plants at harvest

RATE OF SEEDING TO A HECTARE	DISTANCE OF PLANTING	AGE OF PLANTS AT HARVEST IN DAYS												MEAN
		75			90			105			120			
kg.	*cm.*													
11.0	40 × 5.08	5.2	4.5	4.4	4.4	4.9	5.3	9.2	9.3	8.7	3.9	82	76	62.50
13.2	50 × 5.08	3.5	5.0	3.3	5.6	4.6	4.4	6.5	7.3	7.7	5.9	36	56	52.83
15.4	60 × 5.08	4.2	3.8	3.7	4.1	4.4	4.5	3.2	9.3	7.7	5.1	56	58	64.67
17.6	70 × 5.08	4.2	4.3	4.4	4.5	4.1	4.5	2.6	9.3	10.7	5.1	36	42	67.75
19.8	80 × 5.08	5.1	4.5	4.5	4.4	4.0	4.0	7.6	9.6	9.7	8.4	42	54	58.75
Mean		4.31			4.51			7.89			51.60			

Analysis of variance

SOURCE OF VARIATION	DF	SUM OF SQUARES	VARIANCE	COMPUTED F-VALUE	TABULAR F-VALUE	
					5%	1%
Rate of seeding	4	11.14	2.79	1.86	3.26	5.41
Age at harvest	3	123.63	41.21	27.47[a]	3.49	5.95
Rate × age	12	17.94	1.50			
Sampling error	40	85.77	2.14			
Total	59	238.48				

[a] Highly significant.

L.S.M.D. = 0.96

TABLE 7

Height of C. capsularis Linn. as influenced by rate of seeding and age of plants at harvest

RATE OF SEEDING TO A HECTARE	DISTANCE OF PLANTING	AGE OF PLANTS AT HARVEST IN DAYS									
		75									
kg.	*cm.*										
11.0	40 × 5.08	220	160	200	130	215	171	200	194	200	169
13.2	50 × 5.08	125	161	156	141	159	151	171	131	150	155
15.4	60 × 5.08	156	109	171	135	161	151	142	140	121	139
17.6	70 × 5.08	160	170	171	90	141	122	120	130	130	120
19.8	80 × 5.08	100	135	160	140	100	110	110	100	120	115
Mean		146.56									

TABLE 7 (continued)

RATE OF SEEDING TO A HECTARE	DISTANCE OF PLANTING	AGE OF PLANTS AT HARVEST IN DAYS									
		90									
kg.	*cm.*										
11.0	40 × 5.08	230	175	210	140	180	220	180	210	205	207
13.2	50 × 5.08	170	135	165	150	170	160	180	140	155	165
15.4	60 × 5.08	165	120	180	145	170	160	155	145	130	148
17.6	70 × 5.08	175	120	180	100	150	130	128	136	140	129
19.8	80 × 5.08	105	145	175	145	110	118	120	117	109	130
Mean		154.54									

TABLE 7 (continued)

RATE OF SEEDING TO A HECTARE	DISTANCE OF PLANTING	AGE OF PLANTS AT HARVEST IN DAYS									
		105									
kg.	*cm.*										
11.0	40 × 5.08	240	185	220	150	190	230	215	207	200	215
13.2	50 × 5.08	145	180	175	160	180	148	160	170	175	148
15.4	60 × 5.08	175	128	190	150	181	170	165	155	148	157
17.6	70 × 5.08	185	120	200	100	170	141	139	148	151	139
19.8	80 × 5.08	155	117	156	180	150	120	126	131	119	140
Mean		163.98									

TABLE 7 (continued)

RATE OF SEEDING TO A HECTARE	DISTANCE OF PLANTING	AGE OF PLANTS AT HARVEST IN DAYS										MEAN
		120										
kg.	*cm.*											
11.0	40 × 5.08	246	190	230	160	200	238	225	218	209	276	201.50
13.2	50 × 5.08	152	191	179	173	192	156	172	179	180	160	161.38
15.4	60 × 5.08	185	138	200	165	179	165	167	159	165	175	156.50
17.6	70 × 5.08	190	131	209	119	175	151	146	156	157	149	145.45
19.8	80 × 5.08	160	117	166	190	160	125	130	132	129	138	132.63
Mean		173.08										

Analysis of variance

SOURCE OF VARIATION	DF	SUM OF SQUARES	VARIANCE	COMPUTED F-VALUE	TABULAR F-VALUE	
					5%	1%
Rate of seeding ...	4	107,887.03	26,971.76	521.09 [a]	3.26	5.41
Age of plants	3	19,826.28	6,608.68	127.68 [a]	3.49	5.95
Rate × age	12	621.17	51.76			
Sampling error	180	124,945.20	6,941.40			
Total	199	253,279.68				

[a] Highly significant.

L.S.M.D. = 3.51 for rate.
= 3.15 for age.

TABLE 8

Height of C. olitorius Linn. as influenced by rate of seeding and age of plants at harvest

RATE OF SEEDING TO A HECTARE	DISTANCE OF PLANTING	AGE OF PLANTS AT HARVEST IN DAYS									
		75									
kg.	*cm.*										
11.0	40 × 5.08	90	100	111	107	140	110	125	108	110	106
13.2	50 × 5.08	100	124	119	120	121	129	130	130	131	131
15.4	60 × 5.08	118	115	119	109	107	130	128	150	120	129
17.6	70 × 5.08	121	109	140	130	121	135	145	141	119	149
19.8	80 × 5.08	130	141	135	130	140	151	139	140	130	139
Mean		125.04									

TABLE 8 (continued)

RATE OF SEEDING TO A HECTARE	DISTANCE OF PLANTING	AGE OF PLANTS AT HARVEST IN DAYS									
		90									
kg.	*cm.*										
11.0	40 × 5.08	105	110	120	100	115	150	120	130	110	112
13.2	50 × 5.08	110	115	125	150	110	130	140	118	125	135
15.4	60 × 5.08	125	120	125	115	115	140	135	160	128	140
17.6	70 × 5.08	130	115	150	135	130	145	155	150	130	160
19.8	80 × 5.08	140	150	140	135	150	165	150	145	138	147
Mean		131.06									

TABLE 8 (continued)

RATE OF SEEDING TO A HECTARE	DISTANCE OF PLANTING	AGE OF PLANTS AT HARVEST IN DAYS									
		105									
kg.	*cm.*										
11.0	40 × 5.08	156	122	117	110	114	120	125	126	128	112
13.2	50 × 5.08	121	132	128	125	126	135	136	137	141	135
15.4	60 × 5.08	141	126	116	156	116	161	158	120	168	155
17.6	70 × 5.08	137	156	146	131	157	153	145	165	170	180
19.8	80 × 5.08	107	152	159	168	172	165	169	177	175	166
Mean		142.24									

TABLE 8 (continued)

RATE OF SEEDING TO A HECTARE	DISTANCE OF PLANTING	AGE OF PLANTS AT HARVEST IN DAYS										MEAN
		120										
kg.	*cm.*											
11.0	40 × 5.08	111	157	118	121	111	113	119	125	127	129	118.50
13.2	50 × 5.08	131	122	125	128	135	128	135	136	142	136	128.15
15.4	60 × 5.08	127	140	154	118	159	160	121	169	156	152	135.03
17.6	70 × 5.08	136	147	155	132	156	155	145	171	164	181	144.80
19.8	80 × 5.08	106	159	152	169	171	166	169	178	176	162	151.30
Mean		143.08										

Analysis of variance

SOURCE OF VARIATION	DF	SUM OF SQUARES	VARIANCE	COMPUTED F-VALUE	TABULAR F-VALUE	
					5%	1%
Rate of seeding ...	4	27,180.64	6,941.40	165.55[a]	3.26	5.41
Age of plants	3	11,276.65	3,758.88	89.65[a]	3.49	5.95
Rate × age	12	503.18	41.93			
Sampling error	180	24,742.92	137.46			
Total	199	64,703.39				

[a] Highly significant.

L.S.M.D. = 3.25 for rate.
= 2.82 for age.

TABLE 9

Tensile strength of C. capsularis Linn. in kilometers of fiber as influenced by rate of seeding and age of plants at harvest

RATE OF SEEDING TO A HECTARE	DISTANCE OF PLANTING	AGE OF PLANTS AT HARVEST IN DAYS																			MEAN
		75					90					105					120				
kg.	*cm.*																				
11.0	40 × 5.08	17.5	12.0	15.7	14.5	12.0	10.4	12.0	15.0	6.6	11.9	13.0	15.3	11.7	19.1	11.5	10.6	10.9	11.7	9.7	11.4	12.65
13.2	50 × 5.08	25.0	19.2	16.3	18.2	8.2	12.0	16.0	7.2	16.7	25.0	18.0	9.2	14.3	8.6	7.8	9.6	11.5	10.0	6.3	8.0	13.33
15.4	60 × 5.08	14.6	11.2	17.2	11.0	10.8	16.4	15.7	19.5	16.3	19.0	13.2	10.7	10.8	8.1	11.4	12.0	7.4	10.2	10.5	10.8	12.84
17.6	70 × 5.08	12.5	26.0	10.4	5.0	13.6	14.0	19.4	14.3	12.7	15.4	15.0	10.2	10.3	14.6	5.3	9.2	12.0	6.0	11.8	16.8	12.73
19.8	80 × 5.08	10.6	10.7	11.5	9.0	16.1	17.4	20.0	11.2	7.5	21.5	9.3	13.2	11.0	8.8	9.3	10.7	12.8	7.5	10.6	10.8	11.98
Mean		13.95					14.52					11.59					10.33					

Analysis of variance

SOURCE OF VARIATION	DF	SUM OF SQUARES	VARIANCE	COMPUTED F-VALUE	TABULAR F-VALUE	
					5%	1%
Rate of seeding	4	18.84	4.71	0.24	3.26	5.41
Age at harvest	3	334.41	111.47	5.70[a]	3.49	5.95
Rate × age	12	236.73	19.73			
Sampling error	80	1,093.85	13.67			
Total	99	1,683.83				

[a] Significant.

L.S.M.D. = 2.75

TABLE 10

Tensile strength of C. olitorius Linn. in kilometers of fiber as influenced by rate of seeding and age of plants at harvest

RATE OF SEEDING TO A HECTARE	DISTANCE OF PLANTING	AGE OF PLANTS AT HARVEST IN DAYS																			MEAN
		75					90					105					120				
kg.	*cm.*																				
11.0	40 × 5.08	8.2	17.5	16.8	13.6	5.5	15.0	10.8	13.7	14.1	15.4	10.8	16.5	13.3	14.6	16.0	10.8	12.2	13.6	13.7	11.9	13.20
13.2	50 × 5.08	10.0	8.5	17.5	13.5	17.5	20.0	20.0	17.0	20.4	16.2	7.7	14.4	8.0	16.0	14.6	14.2	11.1	9.6	13.3	9.0	13.72
15.4	60 × 5.08	10.1	14.2	8.7	13.2	14.8	20.7	5.0	16.0	20.3	9.4	12.3	8.0	10.3	12.8	13.3	13.0	13.5	14.3	12.4	11.3	12.68
17.6	70 × 5.08	12.5	15.0	12.3	15.2	6.9	17.8	17.2	14.8	17.8	14.6	17.0	12.2	8.2	9.5	18.7	20.2	17.3	9.1	7.3	9.0	13.63
19.8	80 × 5.08	9.1	17.5	22.7	20.7	12.9	15.2	16.3	18.4	15.8	19.5	10.3	15.3	12.0	11.1	12.0	18.3	8.3	6.8	6.0	11.3	13.97
Mean		13.38					16.06					12.60					11.90					

Analysis of variance

SOURCE OF VARIATION	DF	SUM OF SQUARES	VARIANCE	COMPUTED F-VALUE	TABULAR F-VALUE	
					5%	1%
Rate of seeding	4	23.68	5.92	0.40	3.26	5.41
Age at harvest	3	248.11	82.70	5.59[a]	3.49	5.95
Rate × age	12	177.56	14.80			
Sampling error	80	876.76	10.96			
Total	99	1,326.11				

[a] Significant.

L.S.M.D. = 2.38

THE INFLUENCE OF THREE RATIONS ON GROWING CHICKS [1]

TEODORO V. KATIGBAK

WITH FOUR TEXT FIGURES

The ration containing 10 parts copra meal, 15 parts fish meal, and one part Aurofac promoted better growth than the ration with 5 parts copra meal, 20 parts fish meal, and no Aurofac. Reducing the fish meal to 10 parts and increasing the copra meal to 15 parts produced inferior weanlings even with Aurofac supplement.

The influence on growing chicks of three rations containing varying amounts of copra meal, fish meal, and Aurofac [2] was studied in the Department of Animal Husbandry from December, 1951, to November, 1952.

MATERIALS AND METHODS

A total of 285 New Hampshire chicks from the College flock was used in three 12-week trials. The chicks in each trial were divided equally into three lots. The first trial was conducted from February 3 to April 28, 1952; the second trial, from April 18 to July 11; and the third trial, from August 27 to November 19.

The rations compared were composed of the following ingredients, all parts by weight:

	I [a]	II	III
Rice bran	55	55	55
Ground corn	20	20	20
Copra meal	5	10	15
Fish meal	20	15	10
Total	100	100	100

[a] College standard ration.

One part of common table salt was added to 100 parts of each ration. To each of the rations fed to lots II and III was added one part of Aurofac. The rations in the form of dry mash were made available to the birds at all times. Water was also supplied at all hours. When the birds were four weeks old, they were given finely chopped green feed. All the birds were reared in identical brooding quarters and subjected to the same care and management.

[1] Central Experiment Station Contribution No. 1716. Thesis presented for graduation with the degree of Bachelor of Science in Agriculture from the College of Agriculture. Prepared in the Department of Animal Husbandry under the direction of Instructor Amado C. Campos.

[2] Aurofac is a trade name for a vitamin B_{12} and antibiotic feed supplement manufactured by the Lederle Laboratories Division of the American Cyanamid Company.

The weight at hatch and the weekly weights of the birds, the amount and cost of feed consumed, the rate of mortality, and other observations were recorded.

RESULTS AND DISCUSSION

Rate of growth. There were no appreciable differences in the average initial weights of the different lots in the combined trials (table 1). On the twelfth week of all the trials, lot II was heavier than lot III, but only in the first and third trials was lot II superior in weight to lot I. The occurrence of coccidiosis during the second trial caused the drop in weight of the lot II birds.

The weights of the birds varied very slightly throughout the first trial (fig. 1). During the first six weeks, the birds showed a steady rate of growth. Lot II weighed the heaviest, and lot I, the least. On the seventh week, the rate of growth of the birds in lot III began to decrease. From the seventh to the twelfth week, lot I weighed more than lot III, but the difference did not come to more than 50 grams. Although the rate of growth in lot II also decreased, this lot still had the highest weight from the tenth week to the end of the trial.

In the second trial, lot I made the best showing throughout the whole feeding period, followed by lot II and by lot III, which had the poorest rate of growth (fig. 2). The difference in growth rate between lots I and II started from the fifth week when coccidiosis infected the lot II chicks. Unlike in the first trial, lot III chicks consistently had a slow rate of gain and lagged far behind the other lots.

In the third trial, a consistent advantage in weekly weight was shown by lot II over lot I and by lot I over lot III (fig. 3).

The fluctuation in the rate of growth of the lot III chicks may be attributed to the different weather conditions at the time of the study. The first trial was conducted from February to April, a period which is favorable to the growth of chicks; on the other hand, the second trial was conducted from April to July and the third trial, from August to November, months which are unfavorable to chick growth.

Lot III can readily be singled out as the lot that made the least weekly increase in weight during the 12-week period (fig. 4). Lots I and II constantly competed for the lead in weight advantage. Their growth curves crossed each other twice: first on the seventh week and again after the tenth week. On the basis of their final weights, however, the birds in lot II were heavier than those in lot I by a few grams.

The remarkable decrease in rate of growth of lot III started on the fifth or the sixth week of the experiment (fig. 4). It can be surmised that during this period the growth-inhibiting effect of the feed became evident in spite of the presence of Aurofac in the ration.

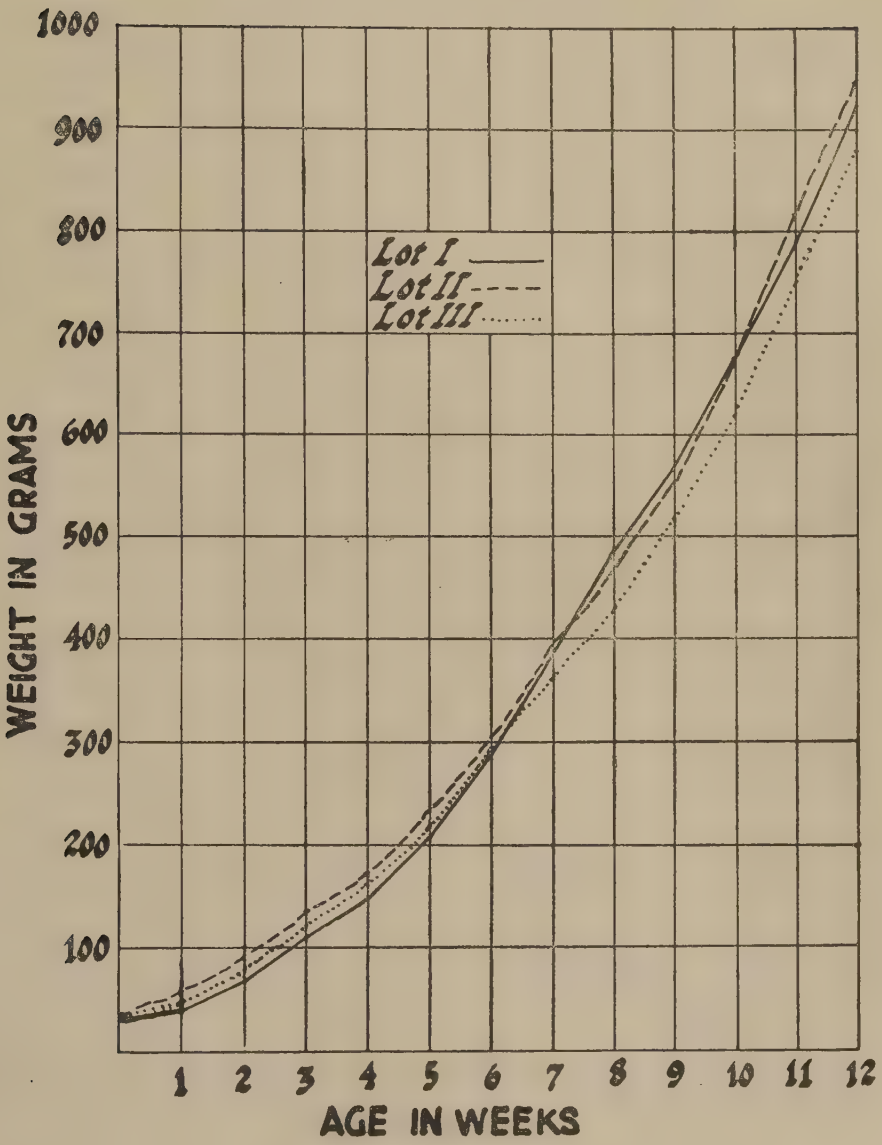

Fig. 1.—The rates of growth in the first trial.

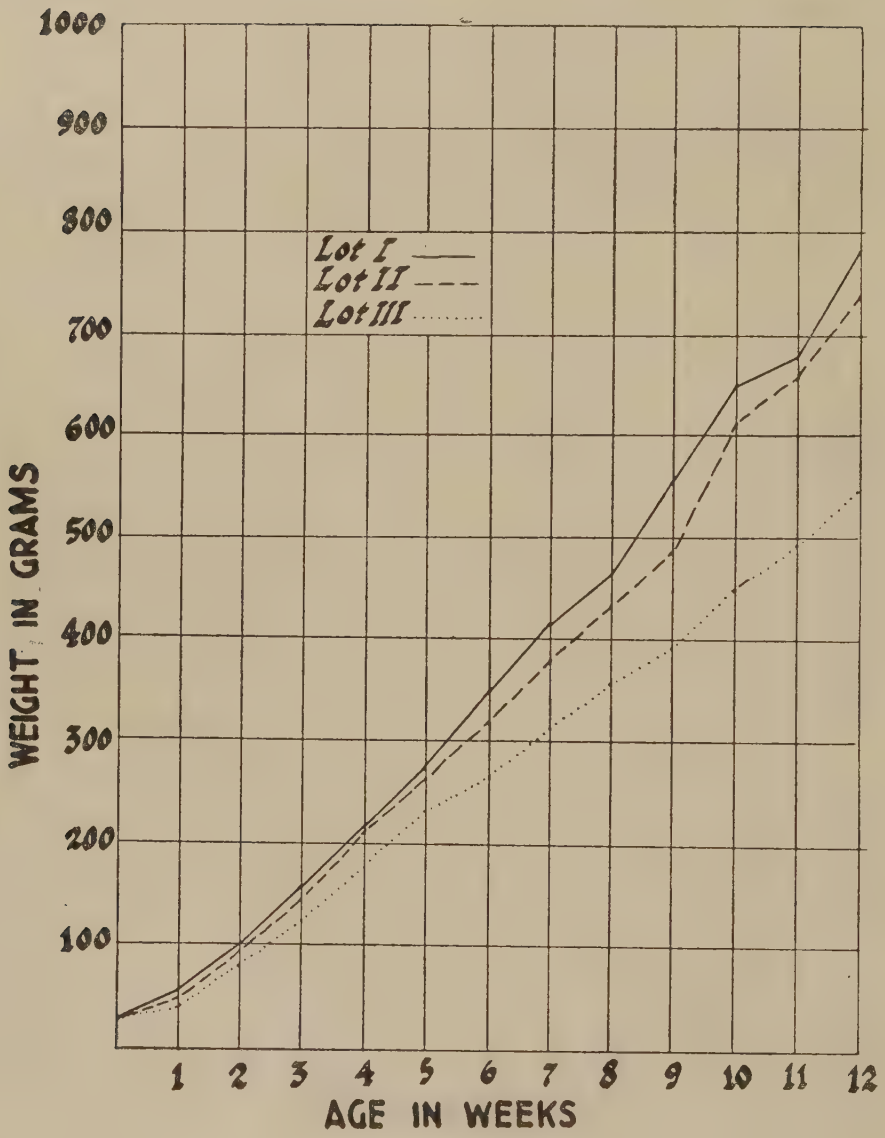

Fig. 2.—The rates of growth in the second trial.

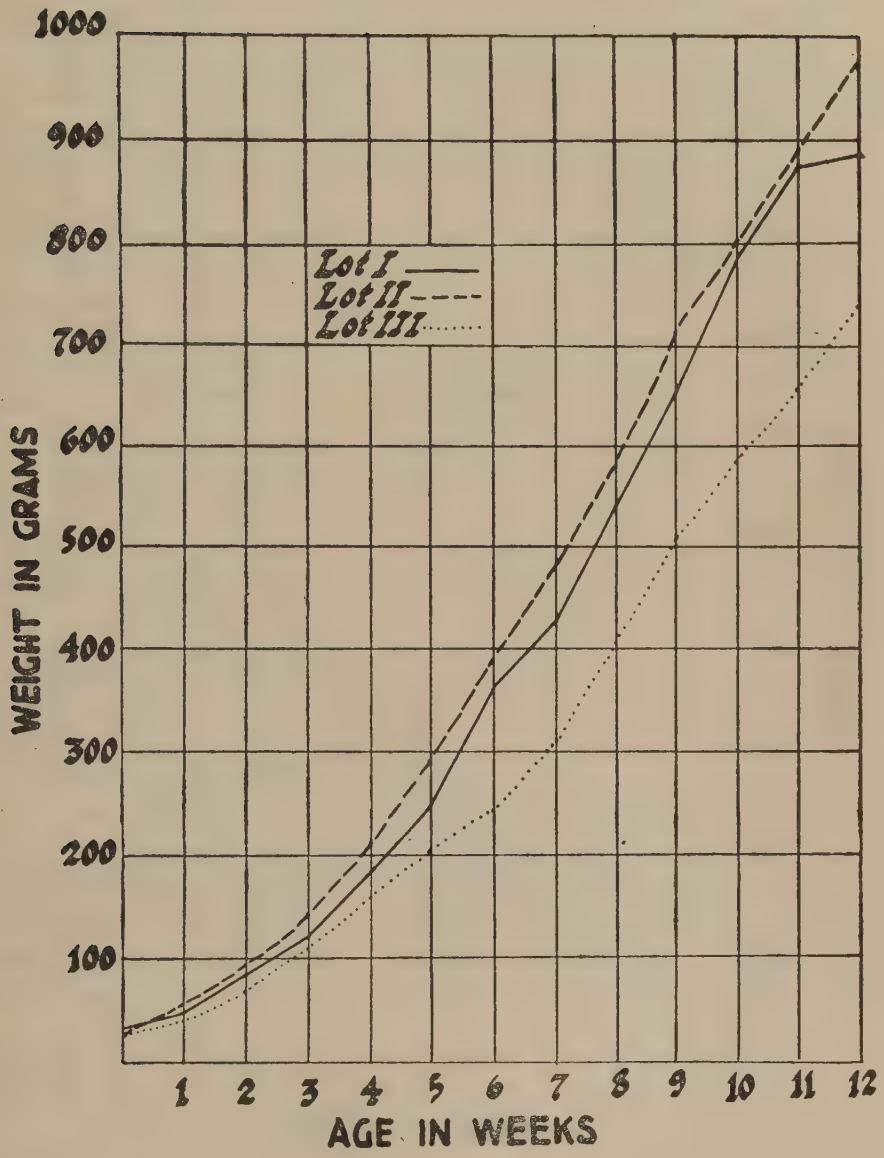

Fig. 3.—The rates of growth in the third trial.

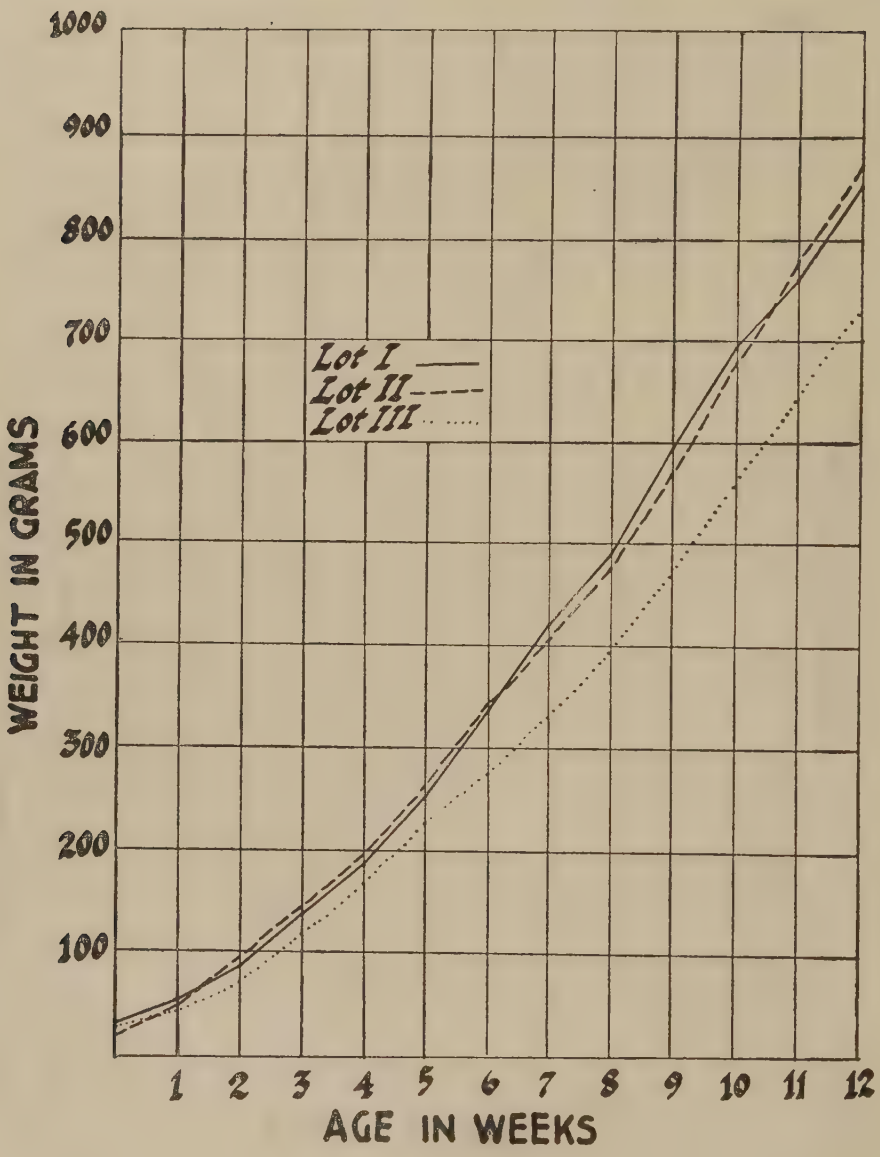

Fig. 4.— The average rates of growth in the three trials.

In lot II, on the other hand, although the feed intake was also increased, the amount of copra meal in the ration was not so great as in lot III; hence, the growth-inhibiting effect of copra meal may have been counteracted by the Aurofac.

Feed consumption and cost. The differences in the amounts of feed consumed by the three lots (table 3) may have been due to the effects of the varying amounts of copra meal and fish meal and the presence of Aurofac on the palatability of the rations.

Although lot III required practically the same amount of feed as lot II to produce a kilogram gain, the cost of feed was much lower in lot III than in lot II because the lot III ration contained more copra meal, which is a cheap ingredient, and less fish meal, which is expensive. Despite the greater amount of fish meal in the lot I ration, it cost less than the lot II ration because the one part of Aurofac and the additional 5 parts of copra meal incorporated in the lot II ration cost more than the equivalent 5 parts of fish meal in the lot I ration.

The final test of a ration is the monetary returns it will give to the poultryman. Based on actual returns above feed costs, lot III gave the highest returns, followed by lot I and lot II. The lower cost of a kilogram of feed in lot III than in lots I and II, together with the high percentage of living birds at the end of the experiment, effected the high returns from this lot. Lot II gave the least returns because of the high cost of a kilogram of feed in that lot.

Mortality. The rates of mortality in the three trials are shown in table 2. Except in the second trial of lot II when most of the deaths occurred within the last three weeks of the brooding period, the majority of the deaths in the lots occurred from the fourth to the seventh or to the eighth week of each trial.

Other observations. The rate of feathering was the same in all the lots, but the degree of pigmentation differed. Lots II and III had darker feathers and yellower shanks than lot I. In lots I and II, because of the faster body development of the birds, the sex could be determined earlier than in lot III. The chicks in all the lots appeared to be normal and vigorous. Not a case of cannibalism was observed.

TABLE 1

Average initial and weekly weights of the chicks in all the lots

AGE IN WEEKS	LOT I		LOT II		LOT III	
	Number of birds	Av. wt. of birds [a]	Number of birds	Av. wt. of birds [a]	Number of birds	Av. wt. of birds [a]
Initial	95	38.0	95	37.6	95	38.0
1	95	55.0	95	58.8	95	57.2
2	93	88.5	95	95.4	95	85.0
3	91	130.2	94	140.1	95	124.3
4	88	181.0	91	194.8	94	171.5
5	84	242.1	84	259.4	91	222.1
6	81	328.9	81	331.6	89	271.3
7	80	411.1	80	411.2	87	334.4
8	79	485.3	79	480.7	85	398.6
9	77	586.6	78	570.9	85	475.9
10	76	693.3	74	687.0	85	556.3
11	76	771.5	74	784.4	85	643.4
12	75	858.0	74	879.8	85	733.0

[a] Based on total number of living birds.

TABLE 2

Rate of mortality

ITEM	LOT I				LOT II				LOT III			
	Trial			Total	Trial			Total	Trial			Total
	1	2	3		1	2	3		1	2	3	
Number of chicks at start	40	35	20	95	40	35	20	95	40	35	20	95
Number of chicks after 12 weeks	26	30	19	75	27	27	20	74	35	30	20	85
Number of chicks that died	14	5	1	20	13	8	0	21	5	5	0	10
Percentage of mortality .	35.0	14.3	5.0	21.1	32.5	22.9	0.0	22.1	12.5	14.3	0.0	10.5

TABLE 3

Amount and cost of feed consumed and returns above feed costs

ITEM	LOT I				LOT II				LOT III			
	Trial			Total	Trial			Total	Trial			Total
	1	2	3		1	2	3		1	2	3	
Amount of feed consumed, kg.	113.4	95.1	71.3	279.8	116.4	86.7	67.8	270.9	132.8	73.6	53.0	259.4
Cost of feed consumed, pesos [a]	30.62	25.68	19.25	75.55	33.76	25.14	19.66	78.56	34.53	19.14	13.78	67.44
Number of birds living on the twelfth week	26	30	19	75	27	27	20	74	35	30	20	85
Total gain in weight, kg.	22.5	22.3	16.0	60.8	24.0	18.7	18.8	61.5	29.3	15.2	14.2	58.7
Amount of feed required to produce a kilogram gain, kg.	5.04	4.26	4.46	4.60	4.85	4.64	3.61	4.40	4.53	4.84	3.73	4.42
Cost of feed required to produce a kilogram gain, pesos	1.36	1.15	1.20	1.24	1.41	1.35	1.05	1.28	1.18	1.26	0.97	1.15
Weight of weanlings produced, kg.	24.01	23.66	16.69	64.36	25.51	20.09	19.51	65.11	30.84	16.55	14.92	62.31
Returns from sales of weanlings, pesos [b]	60.03	59.15	41.73	160.90	63.78	50.23	48.78	162.78	77.10	41.38	37.30	155.78
Actual returns above feed costs from weanlings, pesos	29.41	33.47	22.48	85.35	30.02	25.09	29.12	84.22	42.57	22.24	23.52	88.34

[a] The cost of feed in lot I was ₱0.27 a kilogram; in lot II, ₱0.29; in lot III, ₱0.26.
[b] The price of a kilogram live weight of weanlings was ₱2.50.

THE INFLUENCE OF DRIED COW MANURE AS LITTER FOR GROWING CHICKS [1]

ROMUALDO P. LAPIS

No great advantage was derived from using dried cow manure as litter material instead of the commonly used rice hull. The use of cow manure as litter material is not advisable considering the labor spent in its preparation.

Of the many local litter materials tried for growing chicks, rice hull is considered to be the best (Fronda and Agcanas).[2] Cow manure, which is also available in many farms, is a possible litter material. A feeding experiment by Fronda and Asuncion [3] showed that chicks fed with a ration supplemented with 10 per cent dried cow manure grew faster, were uniformly heavier, and had a lower mortality rate than those fed with an unsupplemented ration. No report has yet been made on the use of cow manure as litter material. To find out how cow manure compares with rice hull as litter material for growing chicks, the present study was conducted in the Department of Animal Husbandry from January, 1952, to March, 1953.

MATERIALS AND METHODS

Three hundred Single Comb White Leghorn chicks artificially hatched from eggs laid by the College flock were used in three trials, each covering a period of 12 weeks. Two lots, each consisting of 50 chicks, were used in each trial. The first trial was conducted from January 24 to April 17, 1952; the second, from April 17 to July 10; and the third, from December 20, 1952, to March 14, 1953. The chicks were distributed at random, legbanded, and individually weighed at hatch. They were raised in electrically heated brooders measuring 1.2 $\times$ 1.0 meters and provided with adjoining pens. Connected to each pen was a small sunning yard, a wire enclosure with a coarse sand floor. The chicks were allowed to sun themselves any time during the day.

Lot I was provided with clean rice hull as litter, and lot II, with crushed cow manure. Both litter materials were spread to a depth of about two to three inches, stirred twice a week, and replaced with

[1] Central Experiment Station Contribution No. 1717. Thesis presented for graduation with the degree of Bachelor of Science in Agriculture from the College of Agriculture. Prepared in the Department of Animal Husbandry under the direction of Instructor Amado C. Campos.

[2] F. M. Fronda and Pablo B. Agcanas, *Philippine Agriculturist*, 27, 112 (1938).

[3] F. M. Fronda and Doroteo C. Asuncion, *Philippine Agriculturist*, 32, 257 (1949).

new materials at the start of every trial. The cow manure used in this study was gathered fresh from the dairy barn of the College and was dried in the sun for three to five days. Its proximate analysis, as determined at the Central Experiment Station Chemical Laboratory, was as follows:

Moisture	11.44
Crude proteins (N × 6.25)	10.35
Crude fats (ether extract)	2.04
Carbohydrates (N.F.E.)	32.97
Calorific value per 100 grams	192.00
Crude fibers	25.62
Ash	17.58

Both lots were given the College all-mash chick ration which consists of the following ingredients, all parts by weight:

Rice bran	55
Ground corn	20
Copra meal	5
Fish meal	20
	100

Common table salt was added to the mash at the rate of one per cent. The mash was given dry and made available to the birds at all times. Green feed, ground shells, and grit were given when the birds were four weeks old. Water was also made available to the birds at all times. Except for the difference in the litter material used, both lots received the same care and management.

The initial and weekly weights of the individual birds, mortality rate, and amount and cost of feed consumed were recorded.

RESULTS AND DISCUSSION

Rate of growth. The average weights of the chicks in the three trials had no marked differences (table 1). Lot I was heavier than lot II by 0.3 gram initially, but from the first to the twelfth week, lot II birds registered consistently heavier weights than those in lot I. The final average weights at the end of the 12-week period indicated a difference of 49.4 grams in favor of lot II. On the assumption that the final average weight of the birds is the only basis of growth comparison and that the control lot is 100 per cent efficient, the experimental lot would be 107.1 per cent more efficient than lot I. The difference of 7.1 per cent shows that the chicks raised on cow manure litter were slightly superior to those raised on rice hull litter in rate of growth.

At the start of trial I, the chicks in lot II were lighter by 0.6 gram than those in lot I. However, during the third, fourth, sixth, tenth, and twelfth weeks of the observation period, lot III birds surpassed those of lot I in weekly weights, accounting for the 3.5 grams advantage of lot II over lot I.

In the second trial, the initial weight of the chicks in lot I was higher than that of lot II by 0.2 gram, but from the first week up to the twelfth week, the chicks in lot II were heavier than those in lot I. On the twelfth week the average weights of the chicks showed a difference of 88.2 grams in favor of lot II.

In the third trial, the average initial weight of the chicks in lot I was higher than that in lot II by 0.01 gram. As in trial 2, lot II birds were consistently heavier than those in lot I from the end of the first week to the end of the twelfth week. The average weights of the chicks at 12 weeks of age indicated a difference of 42.4 grams in favor of lot II.

The twelfth-week average weight of the birds raised on cow manure litter was higher than that reported by Fernandez.[4]

Amount and cost of feed consumed and returns above feed cost. The total amounts of feed consumed by the two lots in all the trials were practically the same. This almost even feed consumption resulted because the small birds in lot I were balanced by the fewer but bigger birds in lot II. Since the two lots needed almost the same amount of feed to produce a kilogram gain in weight and since the same ration was given to both lots, the cost of feed required to produce a kilogram gain would naturally not differ much for lot II. On the basis of actual returns above feed cost, lot II earned only ₱0.20 more than lot I.

Mortality. The experimental lot had a higher mortality rate than lot I in all the trials. For both lots, mortality was highest in trial 1 and lowest in trial 3. In lot I, the greatest mortality during a single period occurred in the fourth week of trial 1. In lot II, the greatest mortality occurred in the second week of trial 1. In trials 2 and 3 of lots I and II, mortality was almost evenly distributed from the third to the eleventh week. Coccidiosis and roup were greatly responsible for the losses in both lots. Roup in its more severe form, which includes swelling of the face, inflammation of the sinuses, and gasping, caused the death of the birds during the later part of the experiment.

[4] R. B. Fernandez, "Comparative Effects of Dried Cow and Carabao-Cow Manures as Supplements to Rations for Growing Chicks." (Thesis presented for graduation with the degree of Bachelor of Science in Agriculture, 1953. Unpublished).

THE INFLUENCE OF THE "FLASH-HEAT" TREATMENT ON THE KEEPING QUALITY OF EGGS [1]

MARCELO M. BARTOLOME

WITH ONE TEXT FIGURE

The "flash-heat" method of preserving eggs reduced the loss of weight of the eggs. The treated eggs had narrower angles of inclination than the untreated eggs. The size of the air cells increased more rapidly in the control than in the treated lot. The height of the yolks decreased a little faster in the control than in the treated lot, and the diameter increased faster in the untreated than in the treated lot. The yolks of the treated eggs remained whole a little longer than the untreated eggs regardless of the season of the year. "Flash-heating" arrested the development of the germs of the majority of the treated eggs. Those that were not killed by the treatment became so weak that it was impossible for them to develop further.

The "flash-heat" method of preserving table eggs seems to retard a little the deterioration of the eggs, but the advantages derived do not appear to be significant enough to be of real value.

The "flash-heat" method of preserving eggs involves the immersion of fresh eggs in boiling water for a few minutes. Romanoff (1944) reported that the "flash-heat" treatment at a temperature above the coagulation point of the albumen proved to be an efficient method of preserving table eggs. The beating power of the albumen and the natural appearance of the yolk were apparently not affected.

Funk (1943) observed that the yolks of eggs dipped in water at 136° to 140°F. (57.8° to 60°C.) for five minutes or longer maintained their upstanding appearance better than those of the untreated eggs and that the commercial grade of the treated eggs lasted longer than that of the untreated. In the cooking tests, the treated eggs held at room temperature for different periods of time were found to be definitely superior to the untreated eggs. The embryonic development in the treated eggs was immediately and permanently arrested.

To determine the influence of the "flash-heat" method on the keeping quality of eggs under local conditions, the present investigation was conducted in the Department of Animal Husbandry from January 23, 1949, to January 12, 1950.

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[1] Central Experiment Station Contribution No. 1718. Thesis presented for graduation with the degree of Bachelor of Science in Agriculture from the College of Agriculture. Prepared in the Department of Animal Husbandry under the direction of Professor F. M. Fronda.

MATERIALS AND METHODS

Five hundred newly laid New Hampshire eggs from the College flock were selected for this study. Two series of observations were made: one during the dry season and another during the wet season. In each series were used 250 eggs, of which 120 were dipped in boiling water for 10 seconds. Of the untreated lot, 10 were examined as fresh eggs. All the eggs were placed in shallow boxes lined with clean excelsior and were kept in the laboratory where they were turned once a day.

A week after the treatment, 20 eggs taken at random, 10 from the treated lot and the other 10 from the untreated, were opened and examined individually. A similar examination was made every week thereafter until the twelfth week.

Loss of weight of the eggs. The eggs studied were numbered and weighed individually. The difference between the weight of an egg soon after it had been taken from the nest and its weight immediately before it was opened for examination represented the loss of weight of that egg during the period of holding.

Angle of inclination of the eggs when submerged in water. Each egg was submerged in clear pipe water, and the centers of the butt and the tip were marked. With these two points as guides to denote the terminals of an imaginary line passing through the longitudinal axis of the egg, the angle of inclination of the egg was measured with a protractor. The average angle of inclination of the 10 eggs examined as fresh was used as the basis for comparing variations in this character.

Height and diameter of the air cells. After the newly laid egg had been weighed, the air cell was traced through a candler with a pencil and then measured with a caliper. The same procedure was followed in determining the size of the air cell immediately before the egg was opened for examination of its contents.

Height and diameter of the yolks. After having been examined externally, the egg was opened and the contents were dropped gently in a Petri dish. The height and diameter of the yolk were then measured with a caliper. In the control lots in both series, the diameter of the yolk could be measured up to the eighth week only because beyond this holding period, the yolk was found to be broken when the egg was opened. Again, the mean measurement of the yolks of the 10 eggs examined as fresh was used as the basis for comparing later measurements.

Strength of the yolks. The strength of the yolk was determined by the method suggested by Peters (1931), that is, by counting the number of times the yolk could be passed unbroken from the palm of one hand to that of the other. In the present study, the distance between the hands was about sixteen centimeters. As with the other

yolk measurements, the strength of yolk of the 10 eggs examined as fresh was used as the basis for comparing variations in this character.

Other observations. To determine the influence of the "flash-heat" method on hatchability, 400 eggs, one-half of which were treated and the other half untreated, were incubated. One hundred eggs from each lot were incubated during the dry season; the same number was incubated during the wet season.

RESULTS AND DISCUSSION

Loss of weight of the eggs. In both series of observations the mean loss of weight of the eggs increased as the eggs became older (table 1), a fact that was also observed by Fronda and Clemente (1936). In the dry-season series, the untreated eggs had a significantly higher loss of weight than the treated eggs only in the first, fifth, and seventh weeks. In the wet-season series, only the differences in the third, tenth, eleventh, and twelfth weeks were significant. Generally, however, in both series of observations the untreated eggs lost more weight than the treated lot. The formation of a thin film of coagulated albumen on the inner side of the egg shell as a result of the "flash-heat" treatment helped prevent the rapid evaporation of moisture from the treated egg.

Angle of inclination of the eggs when submerged in water. All the eggs in the treated lot floated at the beginning of the tenth week; those of the control lot, from the ninth week. In both lots in the two series, some eggs began to float even as early as the forty-ninth day of holding. The angle of inclination of the eggs was therefore measured only up to the ninth week in the treated lot and up to the eighth week in the control.

The mean angles of inclination of the newly laid New Hampshire eggs for the dry-season and wet-season series (table 2) tally with the observations of Fronda and Clemente (1934) for newly laid Los Baños Cantonese eggs. Fronda, Clemente, and Basio (1935) also reported that Los Baños Cantonese eggs laid during the dry season had significantly narrower angles of inclination when submerged in clear pipe water than those laid during the wet season.

The angle of inclination of the untreated eggs in both series was observed to be invariably greater than that of the treated lot, except in the seventh week of the wet-season series when the angle of inclination of the treated lot was higher by 0.4 degree. This was because the air cells of the treated eggs did not increase in size as rapidly as those of the untreated ones. In the eighth week in both seasons, the inclination was the same for the treated and untreated eggs.

Height of the air cells. The untreated eggs had higher air cells than the treated eggs at all the ages observed (table 3). Significant differences in air cell height between the treated and the untreated lots were obtained in the third, fourth, sixth, ninth, and eleventh

weeks of the dry-season series and in the third, fifth, sixth, seventh, and twelfth weeks of the wet-season series. As a whole, the air cells of the untreated eggs increased in height faster than those of the treated eggs.

Diameter of the air cells. In both lots there was an increase in the diameter of the air cells, but the rate of increase was slower among the treated eggs than among the untreated eggs (table 4). The differences in increase of diameter of the air cells between the treated and untreated eggs were significant at all the ages observed except in the third, tenth, and eleventh weeks of the dry-season series and in the seventh and ninth weeks of the wet-season series.

Air-cell index. The air-cell index was determined by dividing the height of the air cell by its diameter. The air-cell indices of newly laid eggs during the dry and wet seasons (table 5) were more or less similar to those reported by Fronda and Clemente (1934) for Los Baños Cantonese eggs. The air-cell index tended to increase as the eggs became older, and in most cases the air-cell index of the control was greater than that of the treated lot. The differences at all ages were, however, insignificant in both seasons, except in the fourth week of the dry-season series. It was also observed that in both seasons the changes in the air-cell index were slightly more regular in the treated lot than in the control.

Diameter of the yolks. The mean diameters of the yolks of one-day-old New Hampshire eggs in the dry-season and wet-season series (table 6) markedly differed from those reported by Fronda and Bensan (1941) for one-day-old infertile and fertile Los Baños Cantonese eggs. The differences were possibly due to the difference in the breed and in the size of the eggs.

Up to the eighth week in both seasons, the rate of increase of the diameter of the yolk was slightly faster among the untreated than among the treated eggs. Afterwards, the yolks of the untreated eggs were found to be broken, whereas some of those in the treated lot remained intact up to the twelfth week. The differences in diameter of the yolk between the treated and the untreated eggs were significant only in the first, sixth, and seventh weeks of the wet-season series.

Height of the yolks. The mean heights of the newly laid eggs in the dry-season and the wet-season series (table 6) differed markedly from those reported by Fronda and Bensan (1941) for infertile and fertile Los Baños Cantonese eggs, probably because of the difference in the breed and in the size of the eggs used. The yolks of the untreated eggs in both series were observed only up to the eighth week of holding because the yolks of the untreated eggs opened beyond this age were found to be broken. The yolks of the treated eggs were higher than those of the control from the first to the eighth week in both series. Significant differences were observed only in the fourth, fifth, and sixth weeks of the dry-season series.

Yolk index. The yolk index was obtained by dividing the height of the yolk by its diameter. The general trend seemed to be for the yolk index to decrease as the eggs became older (table 6). The standing quality, as measured by the yolk index, has been observed by Sharp and Powell (1930), Stewart, Gans, and Sharp (1932), and Fronda and Clemente (1937) to diminish with time. This is due to the fact that as the white of the egg liquefies, the support to the yolk is reduced, especially on the sides (Holst and Almquist, 1931; Stewart, Gans, and Sharp, 1932); hence, the yolk flattens and the yolk index decreases proportionally as the height decreases and the diameter increases. The rate of decrease in the yolk index was, however, faster among the untreated than among the treated eggs. The differences were significant at all the ages in both series, except in the first and second weeks of the wet-season series.

Strength of the yolks. From the first to the fourth week of the dry season, the yolks of the treated lot were markedly stronger than those of the control (table 7). From the fifth to the eighth week, however, the yolks of both the treated and the control lots tended to be of equal strength. Beyond the eighth week, the yolks of the treated lot were still intact but were considerably weak. On the other hand, the yolks of the control lost their strength after the eighth week; they were found to be broken when the eggs were opened. A similar result was noted in the wet-season series, except that the yolks of the treated lot remained stronger a little longer than those of the control.

Appearance of the contents of the eggs. Figure 1 shows the comparative appearance of a newly treated egg and an untreated fresh egg. The cloudy white mass characteristic of the newly treated egg is the coagulated albumen. This coagulated albumen does not stick to the inner side of the shell of the newly treated egg, but does so when the egg gets older. At the age of four weeks, the yolks of the treated and untreated lots were still intact and in good condition, except that in the treated eggs, the cloudy albumen on top of the yolk was still present.

Figure 1 also shows the treated and untreated eggs on the eighth week of the experiment. At this age, the untreated yolks had become flattened and weak. The yolks of the treated eggs were still intact, but were less upstanding than those of the four-week-old eggs. By this time, the coagulated albumen had adhered perfectly to the inner side of the shells; only slight drops of white traces remained with the yolks.

At the end of the experiment, the vitelline membranes of the untreated eggs were found to be broken, and the yolks tended to spread (fig. 1). The vitelline membranes of the treated eggs were still intact but were very weak and were about to break. The yolks

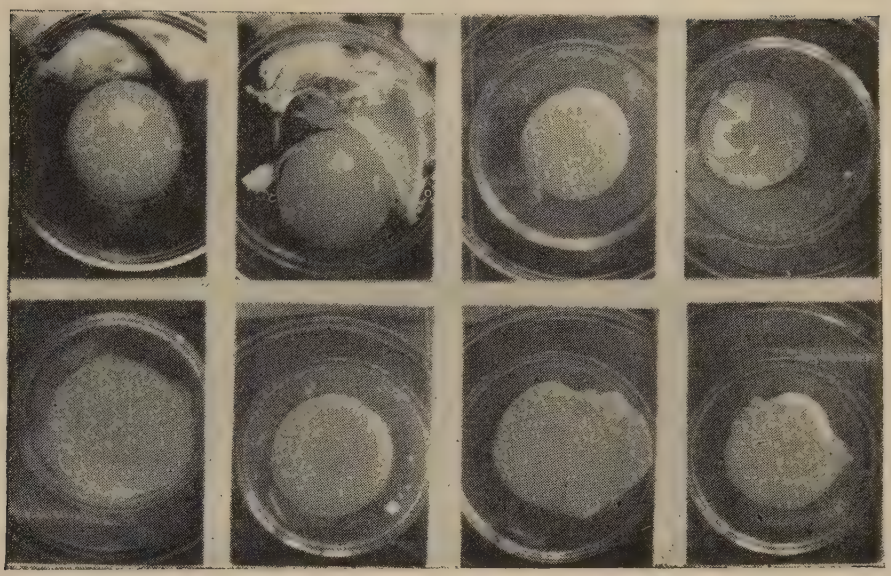

Fig. 1.—Upper panel, left to right: the yolk and albumen of newly laid untreated eggs and the coagulated albumen of treated eggs; contents of four-week-old treated and untreated eggs. Lower panel, left to right: contents of eight-week-old eggs, untreated and treated; contents of twelve-week-old eggs, untreated and treated.

broke completely after they had been passed one or two times from the palm of one hand to that of the other. The albumen of both the treated and the untreated eggs had a watery consistency.

Influence of "flash-heat" treatment on hatchability. Of the 100 treated eggs incubated during the dry season, 94 were clear or had no signs of embryo development, 5 had dead embryos on the first candling, and 1 had a dead embryo on the second candling. None of the eggs hatched. On the other hand, of the 100 untreated eggs, 64 hatched, 15 were infertile, 9 had dead embryos on the first candling, and 12 had dead embryos on the second candling.

In the treated lot of the wet-season series, there were 92 clear eggs, 6 dead eggs on the first candling, and 2 dead eggs on the second candling; none of the eggs hatched. In the control lot, 18 were infertile, 10 were dead on the first candling, and 14 were dead on the second candling; 58 eggs hatched.

Funk (1943) reported that dipping eggs in water at 136° to 140°F. (57.8° to 60°C.) immediately and permanently arrested embryonic development. In the present study, "flash-heating" apparently arrested the development of the germs of the majority of the treated eggs; those that were not killed by the treatment became so weak that it was impossible for them to develop further.

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TABLE 1

Mean weight in grams of eggs held at different ages

AGE	DRY SEASON					
	Treated			Control		
	Initial	Final	Loss	Initial	Final	Loss
weeks						
1	51.956	51.408	0.548 ∓ 0.0161	56.893	56.137	0.756 ∓ 0.0478
2	56.084	54.842	1.242 ∓ 0.1300	52.902	51.591	1.311 ∓ 0.0789
3	54.998	53.065	1.933 ∓ 0.0624	54.168	52.134	2.034 ∓ 0.0853
4	53.086	51.706	2.380 ∓ 0.0920	54.297	51.651	2.646 ∓ 0.1076
5	57.069	53.757	3.312 ∓ 0.1449	56.806	52.717	4.089 ∓ 0.2557
6	60.216	56.394	3.819 ∓ 0.1007	56.404	52.083	4.321 ∓ 0.2232
7	57.881	53.651	4.230 ∓ 0.1323	55.269	50.263	5.003 ∓ 0.2301
8	59.047	54.156	4.891 ∓ 0.2267	58.415	52.878	5.537 ∓ 0.2173
9	59.118	53.170	6.048 ∓ 0.1629	56.543	49.617	6.835 ∓ 0.4282
10	57.041	50.805	6.236 ∓ 0.2683	54.708	47.609	7.196 ∓ 0.3461
11	59.635	52.569	7.066 ∓ 0.1762	55.083	47.295	7.778 ∓ 0.2333
12	55.167	46.694	7.973 ∓ 0.2536	54.856	45.612	8.403 ∓ 0.5419

TABLE 1 (continued)

AGE	WET SEASON					
	Treated			Control		
	Initial	Final	Loss	Initial	Final	Loss
weeks						
1	53.336	52.672	0.664 ∓ 0.0401	53.915	53.128	0.787 ∓ 0.1380
2	55.665	54.483	1.183 ∓ 0.0311	50.370	49.105	1.265 ∓ 0.0517
3	51.696	49.740	1.956 ∓ 0.0755	52.757	50.084	2.671 ∓ 0.2268
4	53.834	51.624	2.110 ∓ 0.1253	50.191	47.825	2.366 ∓ 0.1128
5	50.919	49.264	2.655 ∓ 0.1126	55.287	52.019	3.273 ∓ 0.2722
6	54.312	50.920	3.440 ∓ 0.1628	51.055	47.112	3.943 ∓ 0.2291
7	52.445	48.422	4.023 ∓ 0.1270	55.730	50.230	4.500 ∓ 0.2720
8	51.905	48.316	4.634 ∓ 0.2981	52.065	45.624	5.441 ∓ 0.2059
9	57.058	52.362	5.196 ∓ 0.1425	52.187	46.508	5.675 ∓ 0.1502
10	52.234	46.856	5.378 ∓ 0.2096	52.009	45.399	6.610 ∓ 0.2534
11	55.760	59.610	6.157 ∓ 0.1179	50.987	43.339	7.648 ∓ 0.3776
12	53.118	46.118	6.990 ∓ 0.2220	51.889	43.809	8.180 ∓ 0.0343

TABLE 2

Mean angle of inclination of eggs held at different ages

AGE	DRY SEASON		WET SEASON	
	Treated	Control	Treated	Control
weeks	*degrees*	*degrees*	*degrees*	*degrees*
Newly laid	10.5 ∓ 0.242	10.5 ∓ 0.242	10.9 ∓ 0.252	10.9 ∓ 0.252
1	18.2 ∓ 0.610	21.6 ∓ 0.734	20.1 ∓ 0.384	22.3 ∓ 0.854
2	59.0 ∓ 1.979	66.5 ∓ 2.689	54.0 ∓ 1.814	63.0 ∓ 2.025
3	62.0 ∓ 1.893	71.0 ∓ 2.985	69.5 ∓ 2.038	80.5 ∓ 2.175
4	74.5 ∓ 2.496	85.0 ∓ 1.225	80.0 ∓ 1.415	80.5 ∓ 1.581
5	83.0 ∓ 1.451	86.0 ∓ 0.947	83.0 ∓ 1.451	86.5 ∓ 1.012
6	84.5 ∓ 1.314	87.0 ∓ 1.049	86.5 ∓ 1.012	88.0 ∓ 0.775
7	87.5 ∓ 1.024	87.9 ∓ 0.938	88.7 ∓ 1.083	88.3 ∓ 1.362
8	90.0 ∓ 0.000	90.0 ∓ 0.000	90.0 ∓ 0.000	90.0 ∓ 0.000
9	90.0 ∓ 0.000	[a]	90.0 ∓ 0.000	[a]
10	[a]		[a]	
11				
12				

[a] The eggs floated.

TABLE 3

Mean height in centimeters of the air cells of eggs held at different ages

AGE	DRY SEASON					
	Control			Treated		
	Initial	Final	Loss	Initial	Final	Loss
weeks						
1	0.139	0.290	0.151 ∓ 0.0142	0.144	0.304	0.164 ∓ 0.0040
2	0.140	0.460	0.320 ∓ 0.0236	0.146	0.491	0.345 ∓ 0.0226
3	0.138	0.483	0.345 ∓ 0.0236	0.146	0.581	0.435 ∓ 0.0102
4	0.146	0.606	0.460 ∓ 0.0209	0.153	0.748	0.595 ∓ 0.0285
5	0.148	0.653	0.505 ∓ 0.0263	0.151	0.746	0.600 ∓ 0.0239
6	0.139	0.674	0.535 ∓ 0.0156	0.148	0.778	0.630 ∓ 0.0176
7	0.150	0.845	0.695 ∓ 0.0150	0.157	0.902	0.745 ∓ 0.0251
8	0.145	0.970	0.825 ∓ 0.0203	0.152	1.037	0.885 ∓ 0.0257
9	0.138	0.978	0.840 ∓ 0.0155	0.150	1.050	0.900 ∓ 0.0122
10	0.148	1.043	0.895 ∓ 0.0155	0.146	1.071	0.925 ∓ 0.0215
11	0.144	1.069	0.925 ∓ 0.0128	0.152	1.142	0.990 ∓ 0.0197
12	0.142	1.212	1.070 ∓ 0.0225	0.148	1.283	1.135 ∓ 0.0325

TABLE 3 (continued)

AGE	WET SEASON					
	Treated			Control		
	Initial	Final	Loss	Initial	Final	Loss
weeks						
1	0.130	0.280	0.150 ∓ 0.0042	0.147	0.308	0.161 ∓ 0.0648
2	0.143	0.433	0.290 ∓ 0.0170	0.151	0.506	0.355 ∓ 0.0218
3	0.144	0.504	0.360 ∓ 0.0115	0.149	0.594	0.445 ∓ 0.0112
4	0.146	0.601	0.455 ∓ 0.0180	0.142	0.652	0.510 ∓ 0.0262
5	0.149	0.634	0.485 ∓ 0.0213	0.146	0.761	0.615 ∓ 0.0201
6	0.146	0.706	0.560 ∓ 0.0300	0.145	0.770	0.625 ∓ 0.0237
7	0.146	0.796	0.650 ∓ 0.0158	0.151	0.911	0.760 ∓ 0.0197
8	0.149	0.964	0.815 ∓ 0.0201	0.149	1.024	0.875 ∓ 0.0162
9	0.147	0.972	0.825 ∓ 0.0162	0.150	1.040	0.890 ∓ 0.0137
10	0.147	1.052	0.905 ∓ 0.0150	0.145	1.075	0.930 ∓ 0.0145
11	0.140	1.080	0.940 ∓ 0.0137	0.153	1.113	0.960 ∓ 0.0155
12	0.148	1.193	1.045 ∓ 0.0206	0.145	1.355	1.210 ∓ 0.0222

TABLE 4

Mean diameter in centimeters of the air cells of eggs held at different ages

AGE	DRY SEASON					
	Treated			Control		
	Initial	Final	Loss	Initial	Final	Loss
weeks						
1	1.301	1.650	0.349 ∓ 0.0162	1.320	1.748	0.428 ∓ 0.0288
2	1.330	1.895	0.515 ∓ 0.0490	1.293	2.072	0.778 ∓ 0.0205
3	1.388	2.503	1.115 ∓ 0.0246	1.364	2.659	1.295 ∓ 0.0250
4	1.313	2.573	1.260 ∓ 0.0222	1.312	2.717	1.405 ∓ 0.0230
5	1.321	2.666	1.345 ∓ 0.0522	1.314	2.839	1.525 ∓ 0.0402
6	1.304	2.759	1.455 ∓ 0.0419	1.307	2.902	1.595 ∓ 0.0312
7	1.307	3.122	1.815 ∓ 0.0436	1.298	3.388	2.090 ∓ 0.0604
8	1.304	3.229	1.925 ∓ 0.0267	1.293	3.423	2.130 ∓ 0.0708
9	1.298	3.338	2.040 ∓ 0.0221	1.290	3.570	2.280 ∓ 0.0645
10	1.303	3.403	2.100 ∓ 0.0529	1.298	3.598	2.300 ∓ 0.0883
11	1.305	3.420	2.115 ∓ 0.0645	1.307	3.627	2.320 ∓ 0.0870
12	1.305	3.495	2.190 ∓ 0.0359	1.306	3.666	2.360 ∓ 0.0554

TABLE 4 (continued)

AGE	WET SEASON					
	Treated			Control		
	Initial	Final	Loss	Initial	Final	Loss
weeks						
1	1.321	1.852	0.531 ∓ 0.0120	1.370	1.980	0.610 ∓ 0.0226
2	1.315	2.031	0.716 ∓ 0.0306	1.334	2.334	0.905 ∓ 0.0382
3	1.314	2.399	1.085 ∓ 0.0210	1.317	2.607	1.290 ∓ 0.0254
4	1.312	2.552	1.240 ∓ 0.0227	1.324	2.639	1.315 ∓ 0.0194
5	1.302	2.587	1.285 ∓ 0.0340	1.313	2.763	1.450 ∓ 0.0308
6	1.304	2.689	1.385 ∓ 0.0223	1.297	2.892	1.595 ∓ 0.0343
7	1.310	3.115	1.770 ∓ 0.0509	1.299	3.224	1.925 ∓ 0.0408
8	1.306	3.296	1.795 ∓ 0.0218	1.296	3.316	2.020 ∓ 0.0310
9	1.296	3.231	1.905 ∓ 0.0415	1.310	3.350	2.040 ∓ 0.0586
10	1.301	3.065	1.935 ∓ 0.0317	1.303	3.378	2.075 ∓ 0.0441
11	1.302	3.207	1.945 ∓ 0.0486	1.303	3.463	2.160 ∓ 0.0405
12	1.305	2.916	1.990 ∓ 0.0499	1.295	3.565	2.270 ∓ 0.0401

TABLE 5

Mean air-cell index of eggs held at different ages

AGE	DRY SEASON		WET SEASON	
	Treated	Control	Treated	Control
weeks				
Newly laid	0.112	0.112	0.107	0.107
1	0.176	0.174	0.151	0.156
2	0.219	0.237	0.208	0.227
3	0.207	0.221	0.211	0.227
4	0.235	0.275	0.236	0.247
5	0.244	0.259	0.241	0.272
6	0.246	0.268	0.256	0.268
7	0.264	0.267	0.260	0.282
8	0.284	0.300	0.292	0.309
9	0.290	0.297	0.300	0.310
10	0.293	0.301	0.320	0.323
11	0.312	0.315	0.328	0.328
12	0.345	0.350	0.360	0.380

TABLE 6

Mean diameter, height, and index in centimeters of the yolks of eggs held at different ages

AGE	DRY SEASON					
	Treated			Control		
	Diameter	Height	Index	Diameter	Height	Index
weeks						
Newly laid	4.28 ∓ 0.0463	1.93 ∓ 0.1114	0.450	4.28 ∓ 0.0463	1.93 ∓ 0.1114	0.450
1	4.75 ∓ 0.0018	1.41 ∓ 0.0330	0.297	4.74 ∓ 0.0851	1.29 ∓ 0.0435	0.271
2	4.78 ∓ 0.0785	1.16 ∓ 0.0429	0.243	4.90 ∓ 0.0390	1.06 ∓ 0.0457	0.216
3	4.83 ∓ 0.0043	1.10 ∓ 0.0126	0.228	4.95 ∓ 0.0939	1.02 ∓ 0.0550	0.206
4	4.95 ∓ 0.0311	1.10 ∓ 0.0868	0.222	4.96 ∓ 0.0358	0.98 ∓ 0.0335	0.197
5	5.06 ∓ 0.0696	0.95 ∓ 0.0567	0.188	4.97 ∓ 0.1781	0.80 ∓ 0.0745	0.161
6	5.08 ∓ 0.1293	0.90 ∓ 0.0940	0.177	5.10 ∓ 0.2071	0.73 ∓ 0.1138	0.143
7	5.17 ∓ 0.4308	0.87 ∓ 0.0545	0.168	5.30 ∓ 0.2730	0.70 ∓ 0.0968	0.132
8	5.27 ∓ 0.3015	0.83 ∓ 0.2731	0.157	5.33 ∓ 0.2731	0.50 ∓ 0.2929	0.094
9	5.33 ∓ 0.1527	0.78 ∓ 0.0594	0.146	[a]	[a]	[a]
10	5.36 ∓ 0.2279	0.68 ∓ 0.0545	0.127			
11	5.41 ∓ 0.2187	0.60 ∓ 0.0536	0.110			
12	5.42 ∓ 0.1069	0.60 ∓ 0.0070	0.110			

[a] The yolks were found to be broken when the eggs were opened.

TABLE 6 (continued)

AGE	WET SEASON					
	Treated			Control		
	Diameter	Height	Index	Diameter	Height	Index
weeks						
Newly laid	4.13 ∓ 0.0102	2.05 ∓ 0.1107	0.502	4.13 ∓ 0.0102	2.05 ∓ 0.1107	0.502
1	4.78 ∓ 0.0746	1.41 ∓ 0.0297	0.296	4.63 ∓ 0.0760	1.38 ∓ 0.0395	0.298
2	4.79 ∓ 0.0732	1.22 ∓ 0.0045	0.254	4.75 ∓ 0.1253	1.19 ∓ 0.0483	0.250
3	4.97 ∓ 0.0844	1.16 ∓ 0.0351	0.233	4.93 ∓ 0.1349	1.08 ∓ 0.0625	0.218
4	5.00 ∓ 0.0272	1.03 ∓ 0.0673	0.206	5.03 ∓ 0.1075	0.90 ∓ 0.0334	0.178
5	5.07 ∓ 0.1141	1.00 ∓ 0.0790	0.197	5.40 ∓ 0.1635	0.84 ∓ 0.0724	0.155
6	5.13 ∓ 0.2109	0.99 ∓ 0.0483	0.193	5.40 ∓ 0.1236	0.80 ∓ 0.0393	0.148
7	5.23 ∓ 0.1360	0.96 ∓ 0.0446	0.184	5.75 ∓ 0.1250	0.65 ∓ 0.0559	0.112
8	5.29 ∓ 0.0797	0.87 ∓ 0.0415	0.164	6.00 ∓ 0.0000	0.45 ∓ 0.0383	0.075
9	5.30 ∓ 0.2286	0.73 ∓ 0.1006	0.138	[a]	[a]	[a]
10	5.33 ∓ 0.4308	0.70 ∓ 0.0070	0.131			
11	5.50 ∓ 0.2500	0.67 ∓ 0.0545	0.122			
12	5.60 ∓ 0.2076	0.54 ∓ 0.0671	0.098			

[a] The yolks were found to be broken when the eggs were opened.

TABLE 7

Strength of the yolks [a]

AGE	DRY SEASON		WET SEASON	
	Treated	Control	Treated	Control
weeks				
Newly laid	145.0	145.0	170.0	170.0
1	41.0	27.5	47.9	27.9
2	31.3	24.8 (6) [b]	30.5	20.9 (8) [b]
3	23.0 (6) [b]	13.4 (5)	28.7 (8) [b]	19.3 (8)
4	19.3 (6)	12.4 (5)	15.4 (8)	15.0 (6)
5	12.6 (6)	12.3 (3)	14.8 (8)	10.0 (5)
6	11.3 (6)	12.2 (4)	14.6 (7)	7.0 (5)
7	5.6 (5)	3.2 (4)	4.0 (7)	3.2 (4)
8	3.7 (4)	2.3 (3)	3.6 (5)	2.0 (2)
9	2.7 (3)	[c]	2.7 (4)	[c]
10	2.6 (3)		2.3 (4)	
11	2.0 (3)		2.0 (4)	
12	1.5 (2)		2.0 (2)	

[a] Determined by the number of times the yolks could be passed unbroken from the palm of one hand to that of the other.

[b] The figure in parentheses refers to the number of eggs with intact yolks when the eggs were opened.

[c] The yolks were found to be broken when the eggs were opened.

THE PERFORMANCE OF BERKJALA SOWS FROM FIRST FARROWING TO WEANING [1]

FELIPE C. BELEN

The average number of pigs to a litter at birth was 79, and the average number of pigs weaned was 5.2. The mean weight of the pigs that were born alive was 6.39 ∓ 2.208 kg., and that of pigs that were born dead, 1.97 ∓ 0.563. At weaning, the mean weight of a litter was 41.88 ∓ 9.615 kg. The mean weight of male pigs at birth was 0.95 ∓ 0.031 kg.; that of females, 0.91 ∓ 0.037 kg. At weaning, the mean weight of the males was 7.30 ∓ 0.731 kg.; that of the females was 7.96 ∓ 0.590 kg.

The total percentage mortality of pigs was 34, or an average of 2.7 pigs to a litter. The average age of the pigs that died was 18.14 days.

The total gain in weight of every pig during the nursing period was 5.92 kg., or a daily average of 0.093 kg. The average loss in weight of the sows was 12.86 kg.; the average loss in weight of the sows for every kilogram gain in weight of the pigs was 2.17 kg. The sows that lost the heaviest weight during the nursing period weaned the largest and the heaviest litters.

The average amount of feed consumed during the nursing period was 177.13 kg., of which 159.30 kg. was consumed by the sow and 17.83 kg. by the litter. The average amount of feed consumed for every kilogram gain in weight of the pigs was 15.51 kg.

Local experimental studies on the improvement of swine production have been concerned largely with improved feeding. To some extent, the selection of breeding animals has also been studied. The ideals or standards, however, that have been used as bases for selection are of foreign origin. Considering that the primary functions of the sow are the reproduction and the weaning of satisfactory litters, the performance of Berkjala sows from first farrowing to weaning was studied in the Department of Animal Husbandry from August, 1949, to July, 1950.

Carmichael and Rice [2] reported that the average number of pigs to a litter farrowed by gilts one to one and one-half years old was 7.5 pigs; the average weight of the litter at birth was 2.44 lb. (1.2 kg.). Sows two years of age or older farrowed an average of 8.6 pigs weighing an average of 2.61 lb. (1.19 kg.).

Feliciano [3] found that five sows averaged 9.3 pigs a litter. The weighted average mortality was 26.8 per cent, and the average birth weight of the young was 0.71 kg.

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[1] Central Experiment Station Contribution No. 1719. Thesis presented for graduation with the degree of Bachelor of Science in Agriculture from the College of Agriculture. Prepared in the Department of Animal Husbandry under the direction of Associate Professor Mariano Mondoñedo.

[2] W. J. Carmichael and John B. Rice, *Illinois Agric. Exper. Sta. Bull. 226*, 67 (1920).

[3] Victor T. Feliciano, *Philippine Agriculturist*, **16**, 81 (1927).

Castillo[4] observed that sows with large litters suffered much during the nursing period even when given the best of care and feeding.

MATERIALS AND METHODS

The ten primiparous Berkjala sows from the College herd used in the study ranged in age from 12 months to 25 months at farrowing. They were each confined in a hog pen 2 meters wide by 2.5 meters long, with a concrete floor and a wooden fence. The sows were allowed in the adjoining hog runs three times a day. In lieu of pasturing, they were given green camote leaves every afternoon.

Each sow was fed in a numbered feed container twice a day, from 7:00 to 8:00 o'clock in the morning and from 3:00 to 4:00 o'clock in the afternoon. The ration consisted of the following feeds, all parts by weight: ground corn, 10 parts; fine rice bran, 60 parts; copra meal, 20 parts; and fish meal, 10 parts. A sufficient amount of the mixture was given the nursing sow to last her seven days. At the end of the week the weight of the remaining feed was subtracted from the original amount in the container to get the amount of feed consumed for the week.

During the first few days after farrowing, the sows were gradually brought to full feeding. This took from three to five days, depending on the condition of the individual sows. Those with large litters needed shorter preparations. At the end of this period, each sow was allowed all the feed she could eat.

The last day of the ninth week of nursing was taken as the time for weaning the pigs and for terminating the experiment.

The sows and their pigs were weighed initially soon after farrowing; thereafter, weekly weights were taken at noon. The initial measurement of each sow was taken within 24 hours after farrowing, and the final measurement was taken at weaning time. The sows were measured when they were standing squarely on a level floor. Each measurement was the average of three readings.

The height of the sow was taken from the point of the withers to the floor when the animal was standing squarely on her legs. The length of the body was measured along the natural curvature of the back from the point of the withers to the base of the tail. The circumference of the chest immediately behind the shoulders was measured for the heart girth. In taking the depth of the body, one point of the caliper was placed on the top line of the body midway between the heart girth and the hind girth, and the other point of the caliper, at the middle of the underline of the body. The

[4] Adolfo E. Castillo, *Philippine Agriculturist*, 29, 48 (1940).

breadth of the body was measured from the middle of the right side line to the middle of the left side line of the body between the heart girth and the hind girth.

RESULTS AND DISCUSSION

Number and weight of litters at farrowing and weaning. The number of pigs in a litter at birth ranged from 5 to 10, with a mean of 7.90 ∓ 0.592 pigs. This number is slightly higher than that reported by Carmichael and Rice [5] for gilts of one to one and one-half years old, but lower than that produced by sows two years of age or older.

The mean weight of pigs that were born alive was 6.39 ∓ 2.208 kg., and that of dead pigs, 1.97 ∓ 0.563 kg. The average birth weight of live pigs ranged from 0.81 kg. to 1.12 kg., with a mean of 0.924 ∓ 1.136 kg. This is 0.214 kg. more than that reported by Feliciano.[6] The mean weight of a dead pig was 0.83 ∓ 0.096 kg., the range being from 0.67 to 1.00 kg.

At weaning, the mean number of pigs was 5.20 ∓ 1.123. The weight of the litters ranged from 10.5 to 76.9 kg., with a mean of 41.88 ∓ 9.615 kg. The weight of live pigs in each litter at weaning ranged from 5.25 to 10.71 kg., the mean being 6.199 ∓ 1.121 kg. The two sows which did not wean their pigs were considered in computing the performance of all sows.

Sex ratio. The number of males in a litter ranged from 3 to 8 with a mean of 4.1 ∓ 0.458; the females ranged from 1 to 7 with a mean of 3.8 ∓ 0.573. The sex ratio, therefore, was 51.89. Berkjala sows have no tendency to produce more of one sex.

Weight of pigs at birth and at weaning. The average birth weight of males ranged from 0.80 kg. to 1.30 kg., or a mean of 0.95 ∓ 0.031 kg. In females, the weight at birth ranged from 0.75 kg. to 1.15 kg., with a mean of 0.91 ∓ 0.037 kg. The males at weaning ranged in weight from 3.60 kg. to 9.27 kg., with a mean of 7.30 ∓ 0.731 kg.; the females ranged from 6.70 to 11.80 kg., with a mean weight of 7.96 ∓ 0.590 kg. The differences in weight between the two sexes at birth and at weaning were not significant.

Mortality. Of the 79 pigs born, 27, or 34 per cent, died before weaning. Of the 10 sows, 5 weaned all of their pigs, whereas 2 did not wean any. Sow 269 had 13 per cent mortality among its young; sow 194, 44 per cent; and sow 159, 78 per cent. The pigs that died were from 1 to 61 days old, or an average of 18.14 days; they weighed from 0.4 kg. to 2.6 kg., or an average of 1.14 kg.

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[5] Carmichael and Rice, *op. cit.*

[6] Feliciano, *op. cit.*

Weekly weight of nursing pigs. The pigs alive at birth had an average weight of 0.929 kg. At one week of age, they weighed 1.569 kg.; at two weeks, 1.910 kg.; at three weeks, 2.940 kg.; at four weeks, 3.580 kg.; at five weeks, 4.053 kg.; at six weeks, 5.378 kg.; at seven weeks, 6.218 kg.; at eight weeks, 6.617 kg.; and at nine weeks or weaning age, 7.564 kg. During the nine weeks of the nursing period, each pig made a total gain of 5.924 kg. or an average daily gain of 0.093 kg.

Weight of sows. The initial weight of the sows ranged from 92.6 kg. to 125 kg., or a mean of 104.96 ∓ 3.06 kg. The weight at weaning ranged from 71.3 kg. to 124.4 kg., with a mean of 92.1 ∓ 4.90 kg. The loss in weight ranged from 0.6 kg. to 25.0 kg., with a mean of 12.86 kg. or 12.25 per cent. The mean difference in weight shows that the sows lost weight and changed in condition during the nursing period. The loss in weight of a sow for every kilogram gain in weight of a pig was 2.17 kg.

The loss in weight of the sows during the nursing period appeared to have a direct relation to the number of pigs weaned in the litter, the weight of the litter, and the weight of the pigs weaned. The group that lost the heaviest weight weaned an average of 7.14 pigs to a litter. The weight of the litter was 58.32 kg., and the weight of a pig, 8.09 kg. The group of sows that lost the least weight weaned an average of 0.66 pig to a litter. The weight of the litter was 3.5 kg., and the average weaning weight of a pig, 1.75 kg.

Height. The initial height ranged from 57.0 cm. to 65.0 cm. The mean was 60.50 ∓ 0.85 cm. The final measurement ranged from 56.0 cm. to 65.0 cm., with a mean of 60.90 ∓ 0.84 cm.

Length of body. The initial measurement of length of body ranged from 78.0 cm. to 91.0 cm., with a mean of 84.30 ∓ 1.28 cm. The final measurement ranged from 73.0 cm. to 91.0 cm., with a mean of 84.70 ∓ 1.72 cm.

Heart girth. The initial measurement of the heart girth ranged from 105.0 cm. to 123.0 cm. The mean was 114.60 ∓ 1.79 cm. The final measurement ranged from 98.0 cm. to 128 cm., with a mean of 108.40 ∓ 2.63 cm.

Depth of body. The initial measurement of the depth of body ranged from 43.0 cm. to 58.0 cm., with a mean of 49.50 ∓ 1.22 cm. The final measurement ranged from 43.0 cm. to 58.0 cm., giving a mean of 47.80 ∓ 1.37 cm.

Breadth of body. The initial measurement of the breadth of body ranged from 28.0 cm. to 37.0 cm., with a mean of 31.80 ∓ 0.94 cm. The final measurement ranged from 22.0 cm. to 33.0 cm., with a mean of 28.60 ∓ 0.99 cm.

Feed consumption. Five of the eight litters studied started eating solid feed at the age of three weeks; the other litters, at the age of four weeks. The amount of feed consumed by a litter during the

first week of feeding was 0.34 kg.; the second week, 0.52 kg.; the third week, 1.52 kg.; the fourth week, 3.72 kg.; the fifth week, 5.32 kg.; and the sixth week, or last week of feeding before weaning, 5.48 kg. The average total litter consumption was 17.83 kg., or 2.79 kg. for every pig weaned.

The sows increased their feed consumption from a daily ration of 1.82 kg. in the first week to 2.96 kg. in the ninth week. The average feed consumption of each sow for the entire nursing period was 2.52 kg. daily, or 2.64 kg. for every 100 kg. live weight of the sow.

The average amount of feed consumed by the sows was 159.30 kg. and by the litter, 17.83 kg., or a total feed consumption of 177.13 kg. Therefore, for every kilogram gain in weight made by the litter, 4.99 kg. feed was consumed. When to this was added the loss in weight of the sows, which was 2.17 kg. live weight for every kilogram gain made by the litter and which, according to Mondoñedo,[7] was equivalent to 10.52 kg. feed, the total amount of feed necessary to produce a kilogram gain in weight of the pigs during the nursing period was 15.51 kg. At 14.48 centavos a kilogram of the feed mixture, the cost of the total feed amounted to ₱2.25. According to Mondoñedo, the feed cost in the first litter was 73 per cent of the total. Hence, the feed value to produce one kilogram gain in weight for every pig during the nursing period was ₱3.08.

[7] Mariano Mondoñedo, *Philippine Agriculturist*, 28, 25 (1939).

THREE RATIONS FOR GROWING CHICKS COMPARED [1]

ROMUALDO V. VIJANDRE, JR.

WITH ONE TEXT FIGURE

Rate of growth, feed consumption and cost, and mortality figures in this study show that 5 per cent of the 55 per cent rice-bran constituent of the College all-mash chick ration containing 10 parts of dried ground cow manure can be satisfactorily replaced with a corresponding amount of *binlid* and that 2.5 per cent of the 5 per cent copra-meal ingredient can be replaced with a corresponding amount of mungo meal. The results also indicate that mungo meal cannot effectively replace all the copra meal in the ration.

For many years the chick ration used by the College has consisted of the following ingredients, all parts by weight: rice bran, 55; ground corn, 20; fish meal, 20; and copra meal, 5. To determine if this ration can be improved by replacing part of the rice bran with an equal weight of *binlid* and by replacing copra meal partly or wholly with mungo (*Phaseolus aureus* Roxb.) meal, the present study was conducted in the Department of Animal Husbandry from May, 1951, to January, 1952.

MATERIALS AND METHODS

Three hundred and forty-five day-old Single Comb White Leghorn chicks artificially hatched from eggs laid by the College flock were used in three trials, each covering a period of 12 weeks. The birds in each trial were equally divided into three lots which were brooded separately in identical pens provided with concrete floor and rice hull litter. Each pen had an adjoining well ventilated and heated brooding compartment. In the first trial (from May 2 to July 25, 1951), 114 chicks were used; in the second trial (from October 16, 1951, to January 8, 1952), 117 chicks; and in the third trial (from October 23, 1951, to January 15, 1952), 114 chicks.

The chicks were legbanded and individually weighed soon after they had been taken from the incubator. Thereafter, they were weighed every week until the end of the observation period.

The rations used contained the following ingredients, all parts by weight:

	LOT I	LOT II	LOT III
Rice bran, fine	55	50	50
Ground corn	20	20	20
Fish meal	20	20	20
Copra meal	5	2.5	—
Mungo meal	—	2.5	5.0
Binlid	—	5.0	5.0

Each ration was supplemented with finely ground dried cow manure in the proportion of 90 parts of the mash to 10 parts of the manure.

[1] Central Experiment Station Contribution No. 1720. Thesis presented for graduation with the degree of Bachelor of Science in Agriculture from the College of Agriculture. Prepared in the Department of Animal Husbandry under the direction of Professor F. M. Fronda and Instructor A. C. Campos.

The rations, in the form of dry mash, were given to the chicks during the day. Fresh water was supplied the birds at all times. From the third to the twelfth week, grit and ground shells were made available to the chicks, and finely chopped green feed was given at least three times a week. Throughout the experiment, the chicks were given practically identical care and management.

Records were kept of the initial and biweekly weights of the chicks, the amount of feed consumed, and the mortality in the different lots.

RESULTS AND DISCUSSION

Rate of growth. At the end of the twelfth week in all the trials, except in the second trial when lot I averaged 31.8 grams more than lot II, the average weight of lot II was higher than that of lot I and was much higher than that of lot III (table 1 and fig. 1). The average mean weights at weaning age were not treated statistically because the data on the biweekly weights of the chicks were not independent.

The initial weights of the chicks in the three trials varied slightly among the different lots. Inasmuch as the chicks assigned to each lot came from the same stock, were hatched under the same normal conditions, and were selected at random, the differences in initial weight did not influence markedly the twelfth-week weights (Asmundson and Lerner).[2] The initial weight differences among the lots, therefore, could not be used to invalidate the superiority of the lot II birds over those in lots I and III as regards their twelfth-week weights. The biweekly weight averages in the three trials, moreover, clearly indicate that throughout the experiment, the lot II chicks were consistently heavier than those in lot I, which in turn, were heavier than the lot III birds.

In general, the results indicate that 5 per cent of *binlid* can be used satisfactorily as a substitute for a corresponding amount of rice bran, and 2.5 per cent of mungo meal for a corresponding amount of copra meal in the College chick mash. Completely replacing copra meal with mungo meal produced lighter weanlings.

Feed consumption and cost. Lot II had the highest average feed consumption, followed by lot I and lot III (table 3). Based on efficiency in converting the feed consumed to gain in weight, the lot that consumed the most feed was still the most economical. Lot II was the most efficient and lot III, the least efficient.

Since poultry raisers are more interested in monetary returns than in mere efficiency of feed utilization, the cost of feed to produce a given weight of weanlings becomes the more important criterion in determining the better ration. The salient facts in table 3 show that although the ration given to lot II was more expensive than those given to the other lots, it was nevertheless more efficient in promoting the growth of the chicks and in producing higher returns

[2] V. S. Asmundson and I. Michael Lerner, *California Agric. Exper. Sta. Bull. 675* (1942).

above feed cost than either of the two other rations. The ration given to lot III is an example of a ration that is more expensive but less efficient.

Mortality. The apparently high mortality rates in lots I and III in the second trial and in lots II and III in the third trial (table 2) were due to the incidence of coccidiosis and roup in these lots during the early part of the experimental periods.

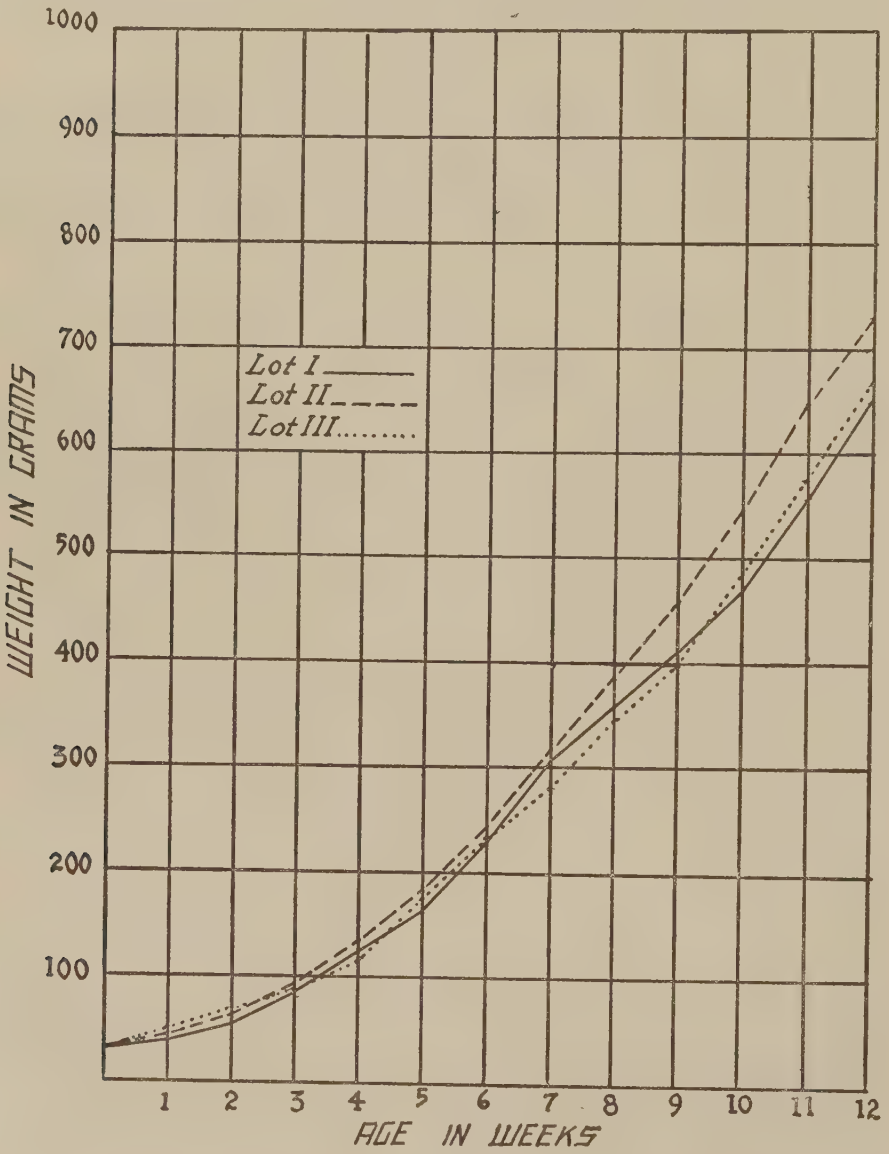

Fig. 1.—Average weights of the chicks in the three lots.

TABLE 1

Average initial and biweekly weights in grams of the Single Comb White Leghorn chicks

AGE	LOT I				LOT II				LOT III			
	Trial			Average[a]	Trial			Average[a]	Trial			Average[a]
	1	2	3		1	2	3		1	2	3	
Initial	36.6	35.2	36.8	36.2	36.2	37.5	37.8	37.1	35.0	35.2	36.5	35.6
2 weeks	52.9	57.3	90.6	67.0	59.5	68.3	104.4	78.4	52.8	62.7	85.3	66.3
4 weeks	98.1	85.6	163.6	115.9	105.3	103.7	182.0	128.4	85.2	82.2	144.8	102.4
6 weeks	175.2	150.5	242.1	189.5	186.3	163.4	295.6	211.2	142.6	107.3	197.5	146.0
8 weeks	278.8	262.5	380.5	308.0	307.4	266.1	437.4	330.0	238.6	143.1	296.8	222.2
10 weeks	410.9	408.2	532.2	456.0	443.9	428.2	620.8	488.8	369.5	247.9	466.0	343.1
12 weeks	552.5	567.6	702.3	611.4	616.3	535.8	804.1	646.4	510.5	369.4	628.6	493.9

[a] Based on total number of birds.

TABLE 2

Mortality rates in the three lots

ITEM	LOT I				LOT II				LOT III			
	Trial			Average	Trial			Average	Trial			Average
	1	2	3		1	2	3		1	2	3	
Number of chicks at start of experiment ..	38	39	38	38.3	38	39	38	38.3	38	39	38	38.3
Number of chicks after 12 weeks	37	32	35	34.7	37	38	30	35.0	37	32	25	31.3
Number of chicks that died	1	7	3	3.7	1	1	8	3.3	1	7	13	7.0
Percentage of mortality	2.6	17.9	7.9	9.7	2.6	2.6	21.1	8.6	2.6	17.9	34.2	18.3

TABLE 3

Cost of feed consumed and returns above feed cost

ITEM	LOT I				LOT II				LOT III			
	Trial			Average	Trial			Average	Trial			Average
	1	2	3		1	2	3		1	2	3	
Amount of feed consumed, kilograms	88.8	77.4	80.5	82.2	96.2	91.2	75.6	87.7	84.2	70.9	62.3	72.5
Cost of feed consumed, pesos [a]	22.20	19.35	20.13	20.55	25.97	24.62	20.41	23.68	23.58	19.85	17.44	20.30
Amount of feed required to produce a kilogram gain	4.62	4.61	3.47	4.23	4.49	4.68	3.33	4.16	4.79	6.79	4.35	5.31
Cost of feed required to produce a kilogram gain, pesos	1.16	1.15	0.87	1.06	1.21	1.26	0.90	1.12	1.34	1.90	1.22	1.48
Weight of weanlings produced, kilograms .	19.0	16.8	23.2	19.7	21.4	19.5	22.7	21.2	17.6	10.5	14.3	14.1
Returns from sales of weanlings, pesos [b] ...	47.55	42.00	57.95	49.16	53.50	48.78	56.75	53.00	43.90	26.13	35.83	35.29
Actual returns above feed cost from weanlings, pesos	25.34	22.65	37.82	28.61	27.53	24.13	36.34	29.32	20.33	6.27	18.38	15.00
Returns above feed cost for 100 chicks, pesos .	68.51	70.78	108.05	82.45	74.41	63.50	121.13	86.33	54.95	19.59	73.52	47.92

[a] Cost of a kilogram of feed: lot I, ₱0.25; lot II, ₱0.27; lot III, ₱0.28.
[b] Price of weanlings: ₱2.50 a kilogram live weight.

CASE REPORT: LEAD POISONING IN AN INDIAN NELLORE BULL[1]

FAUSTINO S. MENSALVAS AND GONZALO V. GARCIA

Lead ranks foremost as a cause of metallic poisoning in animals in the United States partly because lead preparations, such as sprays and paints, are frequently used in the farms. Cattle, in particular, are known to have died as a result of ingesting paints from cans or buckets carelessly thrown about the yard or licking paint from walls, posts, and even billboard signs. In some instances, lead acetate, mistaken for salts, has been given to animals with fatal consequences.

This is a report on a case of saturnism (lead poisoning) in a Nellore bull belonging to the Department of Animal Husbandry, College of Agriculture, University of the Philippines. The animal licked the paint from the walls and posts of the newly painted cattle barn where it was kept.

Subject. The subject was an Indian Nellore bull, about eight years of age, with a live weight of 489 kilograms.

Symptoms. At the outset the disease was characterized by marked prostration, muscular incoordination, especially in the legs, and muscular twitchings. On attempting to walk, the animal staggered and fell repeatedly, arising each time only after much effort. The conjunctiva was congested, and the rectal temperature high (105°F.). The respiration was rapid, and the pulse, fast and weak.

While trying to walk unaided, the animal bumped against posts, walls, and other fixed objects because of blindness and lack of muscular control. There was champing of the jaws and grinding of the teeth. A peculiar symptom was the fluttering of the eyelids which produced a characteristic sound audible at a distance of about four meters.

Morbid anatomy. Hemorrhages in the form of red streaks were found on the mucous membranes of the abomasum and large colon. The lungs were highly congested. Pieces of straw and partly masticated feed were found in the lumen of the trachea, bronchi, and bronchioles when these parts of the respiratory system were sectioned.

Complication. While in a recumbent position two hours after treatment, the animal vomited. Part of the vomitus was inhaled,

[1] Central Experiment Station Contribution No. 1721.

causing mechanical pneumonia which brought about the immediate death of the animal.

Diagnosis. The illness was diagnosed as lead poisoning.

Treatment. To counteract the caustic action of the lead, magnesium sulfate, per orem, was administered by means of a stomach tube. F. E. belladona root was also given orally to relieve the distressing respiratory symptoms.

Anatomico-pathological findings. The anatomico-pathological findings were severe gastroenteritis and gangrenous pneumonia.

COLLEGE AND ALUMNI NOTES

Dr. and Mrs. C. A. Bratton enplaned for the United States on August 20, 1953. They are rejoining the staff of Cornell University where Doctor Bratton is professor of agricultural economics in the College of Agriculture and Mrs. Bratton is associate professor of home management in the College of Home Economics. Before leaving, the couple were guest speakers at an open forum on rural life in the United States and the Philippines which was held on August 13, 1953, under the auspices of the Philippine Country Life Association.

Mr. E. J. Bell, former director of the Agricultural Division, MSA (now FOA), in a letter recently received, thanked Dean Uichanco and the members of the faculty for the courtesy given him. "We believe that you are doing the most important thing which needs to be done to build a successful democracy in your country," Mr. Bell wrote. He is now administrator of the Oregon Wheat Commission.

The incoming and outgoing members of the Cornell group were luncheon guests of Dean and Mrs. L. B. Uichanco on August 9, 1953. Professor Montgomery E. Robinson entertained them and other members of the college community at a party on August 17, 1953.

Among recent campus visitors were the following: Mr. Lucien Auger, ingeniero agricole, Societi Commerciale del Petaud el Alsace; Dr. Banke B. Singh, veterinarian of Lucknow, India; Dr. Ajit-Singh Rye, of Sujjon, Punjab, India; and Mr. D. D. Solomon, of Cornell University, who is with STEM in Bangkok, Thailand.

The members of the Maquiling Ladies' Club held a party on August 8, 1953, in honor of their husbands and of the incoming and outgoing members of the Cornell group.

A literary-musical program in honor of the Dean was presented by the students in Spanish last July 23 at the Chemistry Auditorium. Assistant Dean Santos inducted the officers of "Circulo Hispanista," and Dean Uichanco delivered a speech in Spanish. Vicente Saplala is the president of the society and Messrs. Crispin Lacson and Wenceslao Caballero, the advisers.

Dr. B. M. Gonzalez, '13, wrote the Dean thanking him for the copy of *Livestock and Poultry* (Volume II of *Philippine Agriculture*) and for the *Philippine Agriculturist* and the *Biweekly Bulletin*. "They serve as periodic reminders of the pleasant years spent on the Los Baños campus," he further wrote.

Mr. José S. Gutierrez, '49, returned from the United States on August 5, 1953. He pursued postgraduate studies in food technology and chemical engineering at the Iowa State College as a Fulbright and Smith-Mundt scholar.

Mr. Severino M. Hermosura, '39, acting head of the Department of Zootechnics of the College of Veterinary Medicine, accompanied to the campus a member of the faculty of his College, Dr. Glenn A. Noble, Fulbright professor of parasitology and animal husbandry.

Mr. Pablo Alfonso, Jr., '49, who left recently for the States as a Fulbright and Smith-Mundt scholar, wrote about his experiences in Hongkong, Japan, Hawaii, and San Francisco. He was impressed by the kindness of the American people.

Several alumni now connected with the Bureau of Plant Industry are scheduled to leave for the United States as trainees under the MSA-PHILCUSA technical assistance program. Mr. Marcelino Constantino, '16, will study the operation and management of experiment stations; Dr. Eulalio P. Baltazar, '22, seed testing and certification; Mr. Juan O. Unite, '21, grain grading; and Mr. Julian A. Agati, '23, control of plant diseases.

Dr. Hsu Ching-Chung, Commissioner of the Department of Agriculture and Forestry, and Dr. S. C. Hsu, Director of the Agricultural Research Institute, both of the Taiwan Provincial Government, Taiwan, China, visited the College on August 28, 1953.

Mr. A. T. Boucher, assistant program director, FOA-STEM, Manila, was a recent campus visitor.

Professor Montgomery E. Robinson has offered a prize of fifty pesos (₱50) to the student publishing the best news report about the College and its work. A committee to judge on the merit of the entries has been appointed by the Dean.

The following members of the End-Use Team of PHILCUSA were on the campus recently to make a routine check of FOA-PHILCUSA projects: Messrs. F. A. Garde, E. A. Lottco, Pedro L. Montellano, Cesar J. Reyes, and Miss D. A. Joven.

The Upsilon Sigma Phi Fraternity sponsored a special convocation on August 18, 1953, with Colonel Benito N. Ebuen, commanding officer of the PAF, as guest speaker. Highlighted in the program was the presentation of a portrait and a posthumous award of merit to the parents of the late Lt. Silverio Cendaña, Jr. Pax Ascalon is the Illustrious Fellow and Dr. Faustino T. Orillo, the Fellow Adviser of the fraternity.

The Los Baños chapter of the UP Beta Sigma Fraternity presented a literary-musical program on August 7, 1953. Among the features were a play, "A Night in an Inn," and a skit, "Classroom Capers." Vicente Saplala is the president and Mr. Amado C. Campos, the adviser of the fraternity.

The "Ang Diwa at Panitik," an organization of the UP Rural High School, honored the late President Quezon with a program on August 18, 1953. Mr. Teofilo Sauco and Mr. Emilio Mar. Antonio

were the guest speakers. Aniceto Malabanan is the president of the association and Miss Patrocinio V. Santos is the adviser.

Of the 39 papers presented at the Philippine Sugar Technologists Convention on August 27, 28, and 29, 1953, in the Manila Hotel, 25, or 64 per cent, were contributed by alumni of this College. The present membership of the Association comprises a total of 185, of which 85, or 46 per cent, are alumni of the College. Two of the four division chairmen, as well as the secretary, are Los Baños graduates. They are Dr. Alexander Gordon, '23, of the Division of Agriculture; Mr. Hermenegildo R. Rosales, '27, of the Division of Agricultural Products and By-Products; and Mr. Cenon R. Flor Cruz, '35, secretary of the Association.

On August 31, members of the Association visited the College to see the progress that has been made since the war. In the group were the following alumni: Jose Mirasol, '15, Alexander Gordon, '23, Gonzalo H. Salazar, '25, Federico P. Goseco, '26, Roberto C. Betia, '28, Atanacio Hizon, '28, Angel H. Severino, '28, Basilio Y. Iledan, '30, Manuel Villano, '30, Herminio R. Espino, '31, Julian R. Gomeri, '31, Francisco S. Gomez, '31, Loreto V. Valera, '32, Elias V. Sombito, '33, Alejandro R. Apacible, '34, Abelardo L. Bantug, '34, Cesar T. Mamon, '34, Cenon R. Flor Cruz, '35, Leandro R. Lopez, '36, Abel L. Silva, '36, Jesus Suarez, '36, Pablo C. Enrile, '38, Maximo R. Pegenia, '40, Jose T. Tapay, '45, Filomeno T. Tabayoyong, '47, Francisco E. Mercado, '50, Melencio E. Lopez, '51, Jose B. Cajigal, '52, and Marciano B. Lopez, '53.

Dr. Silverio M. Cendaña, '21, of the Department of Entomology, spoke on the biology of fruitflies before the students of the Philippine Union College when they visited the College on August 17, 1953. Dr. Jose R. Velasco, '40, of the Department of Agricultural Botany, talked on different phases of botany. The students, numbering about 150, were led by their instructor, Mr. R. C. Imperio.

Messrs. Ernesto L. Rigor, '36, and Crispiniano C. Hernandez, '33, both of the Bureau of Soil Conservation, will soon leave for the United States. They have been appointed trainees under the FOA-PHILCUSA technical assistance program.

A central committee led by Dr. Jose M. Capinpin, '20, head of the Department of Agricultural Botany, has been appointed by the Dean to map out the program of activities on Loyalty Day, October 10, 1953. That day being a Saturday, a large number of alumni are expected to attend the celebration. A high percentage of attendance is expected from the following classes: 1913, 1918, 1923, 1928, 1933, 1938, 1943, and 1948.

For the records of the College, alumni are requested to submit their *curriculum vitae* showing (1) name, place and date of birth, and present address; (2) civil status and number of living children; (3) college degrees, years graduated, and institutions from which

obtained; (4) previous positions held and present occupation; (5) membership in honor societies and professional associations; (6) researches and publications; and (7) other activities.

Dr. G. C. Kent, visiting professor of plant pathology from Cornell University, and Dr. G. O. Ocfemia, professor and head of the Department of Plant Pathology of the College of Agriculture at Los Baños, delivered lectures at the Technical Personnel Training School and Abacá Growers Mosaic Conference in Davao from September 7 to 12, 1953. The conference was under the auspices of the Bureau of Plant Industry, College of Agriculture, Bureau of Agricultural Extension, and PHILCUSA-FOA.

A Coffee Round Table Meeting of some distinguished scientists and technicians of America, Asia, and Africa was sponsored in San Jose, Costa Rica, from September 15 to 26, 1953, by the Ministry of Agriculture and Industries of Costa Rica, the Inter-American Institute of Agricultural Sciences, and the International Coffee Association (FEDECAME), with the help of other agencies like the Research Development Division, Foreign Agricultural Service, United States Department of Agriculture. The meeting was organized to consider the threat of the coffee rust caused by *Hemileia vastatrix* in Latin-American countries. The organizing secretary, Dr. Frederick L. Wellman, urged Dr. G. O. Ocfemia, of the Department of Plant Pathology of the College of Agriculture at Los Baños, to attend and take an active part in the meeting. In his telegram of September 4, 1953, Dr. Wellman stated that the management of the conference would pay Dr. Ocfemia's transportation and subsistence expenses.

The College is appealing to its alumni for donation of the following issues of *The Philippine Agriculturist* to complete its collection in the College Library.

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